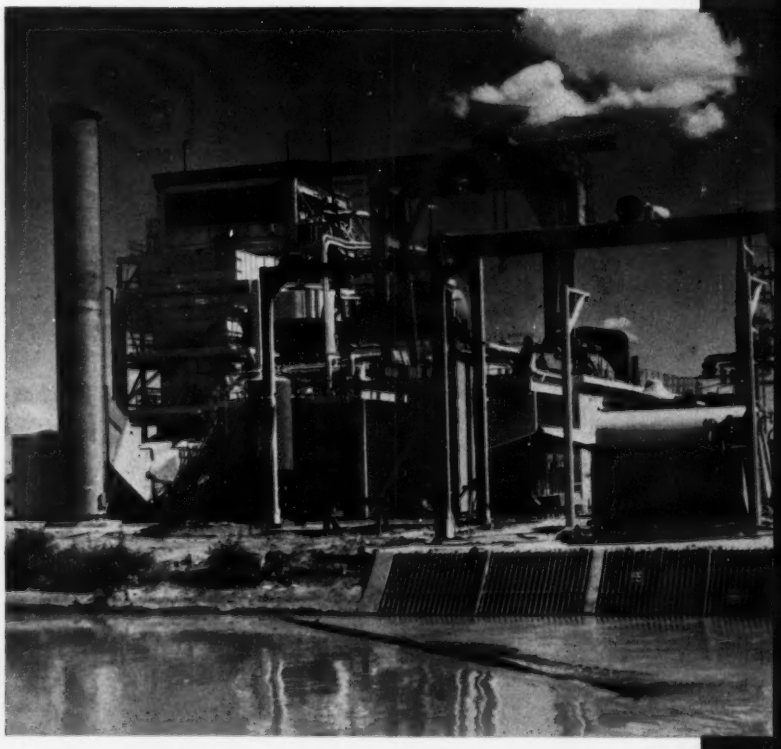
ELECTRICAL WEST

August 1952
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Adequate Wiring Visualized..... 88



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In the balance... **profits!**

Balance is an extremely desirable quality in diets and in budgets. And a quality that is becoming harder and harder for today's homemakers to maintain.

So the opportunity offered in this Edison advertisement on electric home food freezers is more than just a neat trick. In magazines and by mail (as a part of Edison's popular "Electrical Times") it carries a promise of "better eating for less money" to every homemaker in Edison territory.

Advertisements like this one make the appliance dealers of Central and Southern California a definite part of the promise. So there is something in the "balance" for *them*, too—food freezer sales.

Customers and dealers both profit when "Edison tells them and the dealer sells them!"

balance 'em both
with an electric
home food freezer
BALANCING DIETS and budgets at the same time is a neat trick. And you can do it, with an electric home food freezer.
It's easy—because the high quality and nutrition contained in the fine foods you can buy and store are preserved in your freezer and are "on call" when you want them. To help make ends meet in your budget, you can take advantage of lower prices for quantity purchases and also stock up and save whenever you see a real food bargain.
Food in your freezer is like money in the bank. Chances are that you'll save enough in a short time to pay for the freezer, so see your dealer now.
Southern California Edison Company
Edison

Edison **SOUTHERN CALIFORNIA EDISON COMPANY**

Feature of the 54-ton rotor is its winding of Condal, new aluminum alloy developed by G-E research. Lighter than copper and equally as strong, Condal solves problem of high centrifugal forces that previously limited rotor size. Installation being inspected by C. H. Holley, engineer, and H. D. Taylor, in charge of generator engineering.

Trend to larger generating units gains impetus with

FIRST 3600-RPM GENERATOR OVER 200,000 KVA

Problem of shipping huge stator has been solved by double frame construction, with outer frame to be shipped in three sections. Progress of stator winding is here checked by C. E. Kilbourne, C. Schabtach, W. E. Saupe and C. S. Coggeshall.

With the continued growth of most systems and the need for supplying ever-increasing amounts of power, the electric utility industry is looking more and more to large, high-efficiency generating units as the most economical answer to today's expanding loads and rising costs.

Confidence in the performance of such units and in the ability of engineers to design them is shown by the number of generators with ratings of 200,000 kva and above on order at General Electric.

Construction of the first 3600-rpm, 220,500-kva generator to be in operation is nearing completion, with delivery scheduled this summer. Three companion units will be delivered by early next year. In all, a total of 18 large 3600-rpm machines above 200,000 kva is on order.

Indicative of today's rapid progress in solving the very complex design problems is the fact that this first unit was ordered only in January, 1951. Now, even larger designs are on the drawing boards. The trend to increasing generator size, with higher efficiencies and consequently lower costs per kilowatt-hour, will continue. General Electric Company, Schenectady 5, New York. 301-190

MORE POWER TO AMERICA

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

AUGUST 1952

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-fifth year of publication

VOL. 109 NO. 2

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coatz, Typography

Next Month

Our September issue each year is one in which illuminating engineering and lighting practices are emphasized. Progress in the technology of the art and new applications are featured.

At this writing the contents are not fully jelled but much good material is promised. Domestic, school, commercial, street and highway, and industrial lighting will come in for full treatment.

There will be something on light sources and a thought-provoking piece is promised on a 40-kw high-voltage series-lighting circuit for industrial and commercial installations. Economy in wiring is the object. And the code permits such circuits.

In engineering the Cabinet Gorge plant and transmission line of Washington Water Power Co. will be featured. A record for speed of construction was set.

Techniques of high-voltage maintenance testing of generator and synchronous condenser windings will be the subject of an article of unusual interest to operating engineers.

Wearing of high dielectric strength "hard" hats by linemen and other electrical workers as a safety measure is a subject of tremendous interest to utility men. One organization is making the wearing of such hats optional and will tell of its experience.

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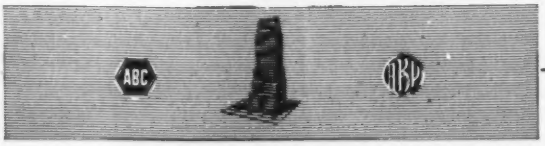
San Francisco (4)..... Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600



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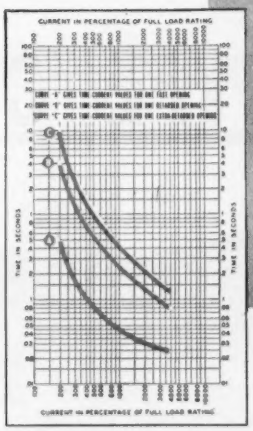
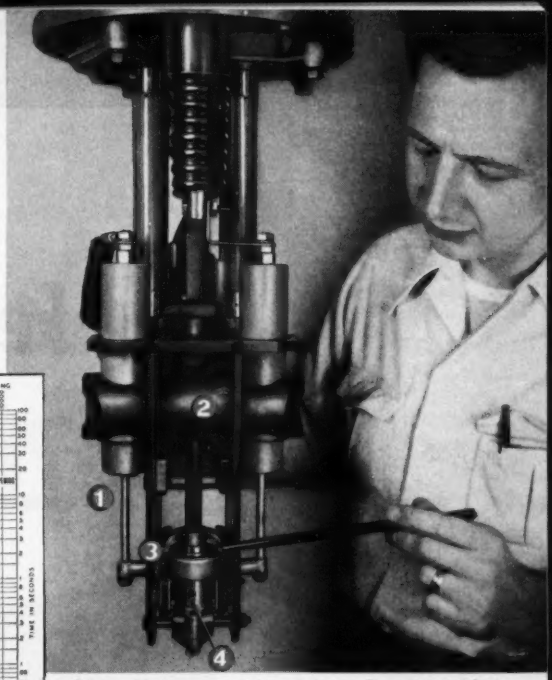
L-M's Kyle Type E 23 kv recloser outranks all others in its class for dependability, long service, low maintenance, and interrupting capacities. New higher interrupting capacity and 150 kv BIL assure ample safety factor.

"Universal" terminals for copper or aluminum conductor
Oil-filled clamp-on bushings—extremely low radio noise level
Heavy aluminum cover with operating handle, operations counter, and optional Kyle non-reclosing device lever under sleet hood
Heavy tank with welded bottom for better support, better protection
KYLE
ORTO

CHOICE OF SEVEN SEQUENCES

Only Kyle reclosers offer choice of three time-current curves and seven standard operating sequences. Curve A, fast; curve B, retarded; curve C, extra-retarded. Permits close coordination with fuses and other reclosers in series.





Oil cross blast arc extinguishing mechanism. The contacts of finest arc-resisting material (1) draw two arcs in series. Gas formed by one arc blasts the oil in the cross-blast chamber (2) across the other arc, extinguishing it instantly. The engineer points to the contact buffer mechanism (3), which permits varying contact opening speed by means of a removable plug (4). This insures best interrupting performance at both 23kv and up to 14.4 kv.

L-M's KYLE Type E 23 kv Recloser Now Interrupts up to 1750 Amperes at 23 kv

To meet heavier load requirements, interrupting capacities are increased to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv. Provides full 150 kv BIL insulation, giving greater insulation safety factor with longer life. For all distribution voltages from 2.4 to 23 kv.

The heavy insulation and the improved oil cross blast method of arc extinction make the Type E an outstanding recloser for high voltage application, and provide an intermediate duty recloser up to 14.4 kv.

Oil-filled clamp-on bushings provide radio noise level well below NEMA standards. Plated Universal terminals for either copper or aluminum conductor. The recloser is available with a choice of eight coil ratings, three time-current curves, and seven tripping sequences. Coils and sequences are easily changed *in the field.*

Like all Kyle reclosers, the Type E is filled with ORTO®, L-M's oxidation-resistant transformer oil.

Get details on this exceptional recloser, which has proved so successful in service. Ask the L-M Field Engineer for copy of bulletin on the Kyle Type E, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company division).

Type E Single Phase
Nominal Rating 23 kv, BIL 150 kv

Rating Amperes	Minimum Tripping Current Ampere	Interrupting Ratings* Symmetrical RMS Amperes at Maximum Phase to Phase Nominal Voltage of: 14.4 kv	23 kv
5	10	200	125
10	20	400	250
15	30	600	375
25	50	1000	625
35	70	1400	875
50	100	2000	1250
70	140	2500	1750
100	200	2500	1750

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

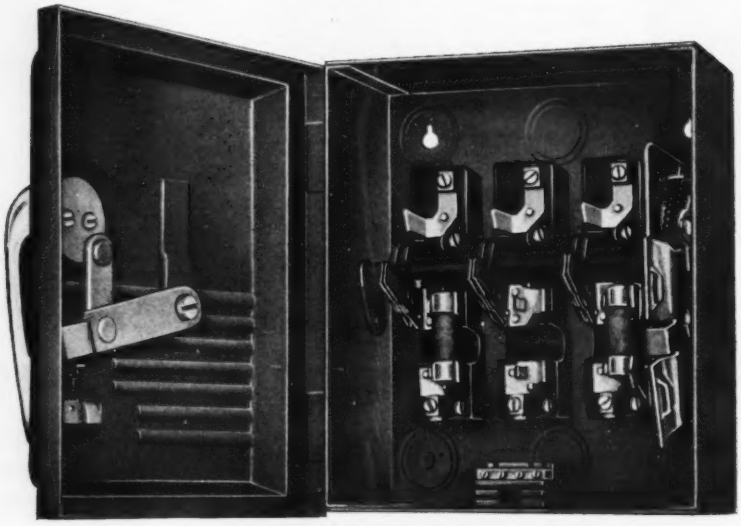
LINE MATERIAL
Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

SLASH YOUR

Now–Federal Noark TYPE

at TYPE "C" prices!



Install the best and save money too! Meet every requirement up to 1200 amps. with the new Federal Noark ACI Industrial Type "A" Switches. Up to and including 200 amps., ACI switches give you all the design advantages of the now famous Front-Operated Safety Switches and provide a *real* Type "A" Switch at Type "C" prices.

The new ACI Industrial Switch line—with voidable interlock—completely eliminates the old Type "C". Selection is further simplified by adding a solid neutral block to each switch through 200 amps. Now each and every switch within this range meets the requirements of *four or more* switches under the old system.

The new Front-Operated ACI makes maintenance a cinch. A glance at the man-sized handle, even from across the room, tells instantly whether the switch is "on" or "off." Coolest operation is assured by the patented fuse holder and by only two joints per pole, both under extreme pressure. Maximum safety is provided by guaranteed current break, special arc mufflers or Rolarc snuffers, and accommodations for four padlocks.

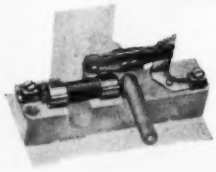
Order money-saving ACI Industrial Switches from your Federal Noark wholesaler for any "A" or "C" specification.

TYPE "D" LINE ALSO SIMPLIFIED

SWITCH COSTS!

"A" ACI Industrial Switches

FEATURES OF FRONT-OPERATED ACI INDUSTRIAL SWITCHES



COOLEST OPERATING . . . There are only two joints at each pole, both under tremendous pressure. As proved by field experience this is the coolest, most practical type of switch-blade construction.

COOLEST OPERATING . . . Pressure spring of the patented fuse holder is located in block under fuse where unaffected by fuse heat. No screws to vibrate loose or to forget to tighten.

SAFEST . . . This is the only visible blade switch with the operating cross bar beneath the switch blades. The operator is safeguarded because contacting blades are always forced open.

SAFEST . . . All 100 and 200 amp., 230V. Federal Noark Front-Operated ACI Industrial Switches have arc mufflers. Patented Rolarc Snuffers are used on all 575V. switches.

SAFEST . . . Man-sized, streamlined handle smoothly and dependably snaps the switch to "on", "off", or "cover open" position. Handle can be locked with as many as three padlocks.

EASIEST TO MAINTAIN . . . High Pressure Fuse Clamps allow ready "pull out" removal and "snap in" insertion of fuses. No cross bar or fibre hooks interfere with fuse removal.

FEDERAL ELECTRIC PRODUCTS COMPANY

50 PARIS ST., NEWARK 5, N. J.

FEDERAL NOARK®

Federal NOARK

ACSR and

ALCOA

ALCOA

Alcoa Technical Co-operation

Alcoa pioneered aluminum conductor over 50 years ago . . . has been supplying technical co-operation ever since. That's why Alcoa developed a staff of technicians first in their field.

The six men in the photograph at left have been Alcoa Electrical Conductor Supervisors for an average of seventeen years—a total of over a hundred years of customer service. They represent the quality of the men behind the quality of the product.

For Alcoa delivers only the highest quality wire and cable, aluminum or ACSR, to every job.

Call your nearest Alcoa sales office for Alcoa aluminum wire and cable . . . the best in service.

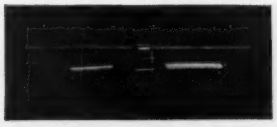
ALUMINUM COMPANY OF AMERICA
2103-H Gulf Building • Pittsburgh 19, Pennsylvania

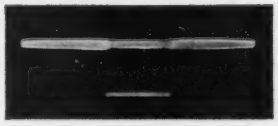
ALCOA TELEVISION — CBS Network, 6:30 to 7:00 P.M. EDST every Sunday on most stations — 8:30 to 9:00 P.M. in far West

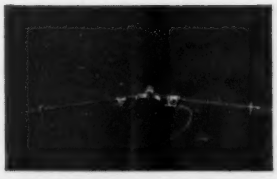
FIRST IN ALUMINUM
FIRST IN A·C·S·R

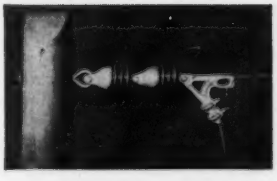
ALCOA ACCESSORIES

Alcoa has developed a complete line of job-proven accessories for aluminum cable and ACSR.









How you can use RM-ASA Power Transformers where "specials" seem to be required

...and get several months faster shipment and up to 8% lower price

Many power transformer applications require voltages, impedances, and tap arrangements which apparently can be provided only by non-standard transformers. Often, you can meet these requirements with G-E RM (Repetitive Manufacture) transformers which conform to the new ASA standards. At the same time, you obtain attractive savings in both time and money. For example, with RM-ASA Transformers...

YOU CAN OPERATE AT NON-STANDARD VOLTAGE:

One optional feature of RM-ASA transformers provides that the high-voltage rating for each insulation class above 5 kv can be varied over a 20% range. This means, also, that by under-exciting you can obtain secondary voltages other than EEI-NEMA Preferred Voltage ratings. There may be some sacrifice in rating, of course—but you will get more kva per dollar than with a special transformer.

Example: You have a standard 34.5-kv primary, but want a non-standard low voltage of 2300. Select an optional RM-ASA rating of 36 to 2.4 kv. Operate at 34.5 kv. You'll get your 2300 volts.

You pay 1% for the optional high voltage. You save 8% in base price. You get faster delivery.

YOU CAN GET ALL TAPS ABOVE OR BELOW THE ACTUAL PRIMARY VOLTAGE:

With RM-ASA transformers, you get two taps above and two below the rated primary voltage. By selecting an optional primary rating, you can get all four taps above (or all below) your actual line voltage.

Example: Your high voltage is 34.4 kv. You want all taps below this. By selecting 32.8 kv for the primary rating, you get taps at 34.4, 33.6, 32.0 and 31.2 kv.

You pay 1% for the optional voltage. You save 8% in base price. You get faster delivery.

YOU CAN PARALLEL TRANSFORMERS WITH DIFFERENT IMPEDANCE:

Impedances of RM-ASA transformers are fixed at 5.5% to 7.0%, depending on high voltage. While this affects division of load when an RM-ASA unit is paralleled with an existing transformer, it is not as critical as you might think. It seldom results in a serious loss of capacity.

Example: You want to parallel a 34.4-kv RM-ASA transformer (impedance, 6%) with an existing unit having an impedance of 6.6%. Theoretical division of load is about 52%—48%. Often actual division will be even better than this because of external impedances. At worst, you have lost less than 5% in capacity. You have saved 8% in cost, gotten faster delivery.

YOU CAN PARALLEL △-Y WITH Y-△

While in most ratings, RM-ASA transformers are available as △-Y or △-△, a △-Y RM-ASA transformer can almost always be paralleled with an existing Y-△ unit. In fact, there is one advantage: You can ground the high side through the old unit, the low side through the new RM-ASA unit.

YOU HAVE 20 OPTIONS AVAILABLE:

These include: optional primary voltages—load-ratio-control—bushing current transformers—fans or provisions for future fans—junction boxes, and many others. RM-ASA power transformers are available in ratings up to 5000 kva single-phase and 10,000 kva three-phase. The ratings cover all EEI-NEMA Preferred Voltages—high and low—69 kv and below.

Let us help you apply RM-ASA transformers. For additional information, contact your nearest G-E representative. *General Electric Co., Schenectady, N. Y.*

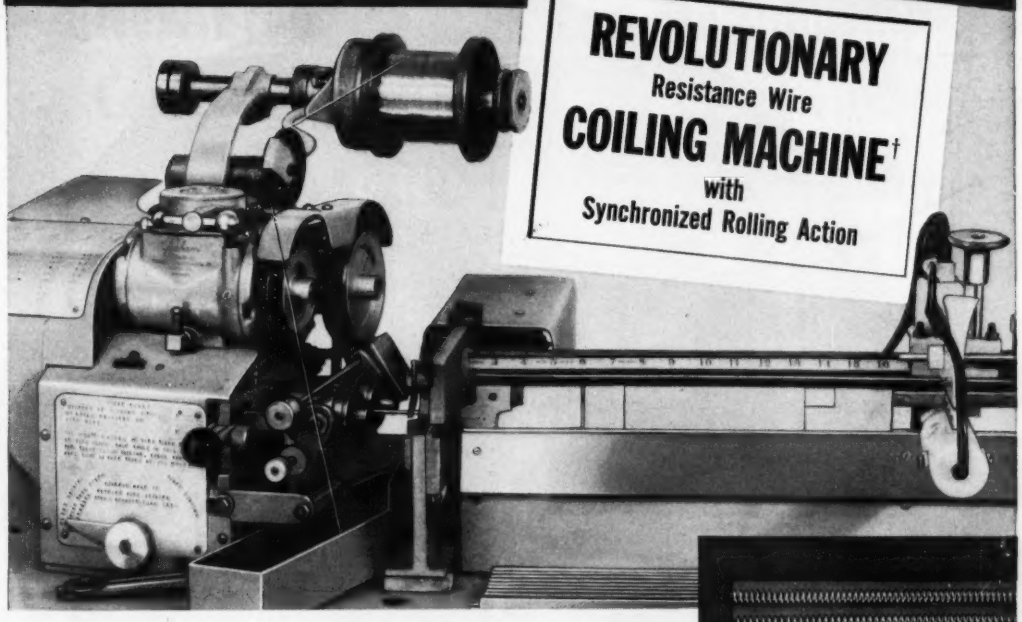
401-33

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

DRIVER-HARRIS ANNOUNCES . . .

REVOLUTIONARY Resistance Wire COILING MACHINE† with Synchronized Rolling Action



As producers of the world famous "Nichrome"* and other outstanding electric heating and resistance alloys, Driver-Harris engineers are interested in obtaining application results commensurate with the exceptional advantages their alloys afford. Therefore they have developed a new coiling machine which eliminates wire coiling faults—especially coil irregularity due to work-hardened areas produced during coil formation.

This new machine is the result of knowledge accumulated during forty years of close association with wire coiling problems. Its revolutionary principle of operation—*the synchronized rolling action of all coiling parts*—results in vastly improved performance over that of any other type machine.

Product of long study and a thorough knowledge of the requirements of the industry, this Driver-Harris unit—

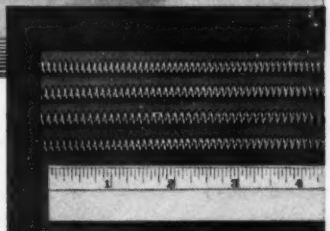
(1) handles the full range of resistance wire coiling normally required, close or open winding (and can be adapted for twin wire coiling);

(2) cuts coil ends clean on all sizes, close or open wound;

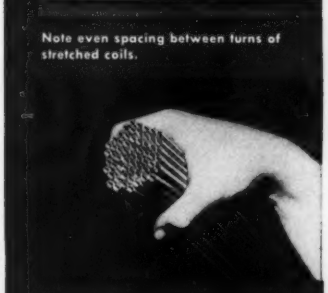
(3) maintains resistance accuracy of cut coils at all times by photo-electric control (variation not exceeding ± 1%);

(4) affords the lowest operational and maintenance costs of any comparable coiling machine.

Standard Model coils #20 to #36 B&S gauge wire. Units for other gauges built to order. Send for illustrated Bulletin C-52, giving full information.



Note even spacing between turns of stretched coils.



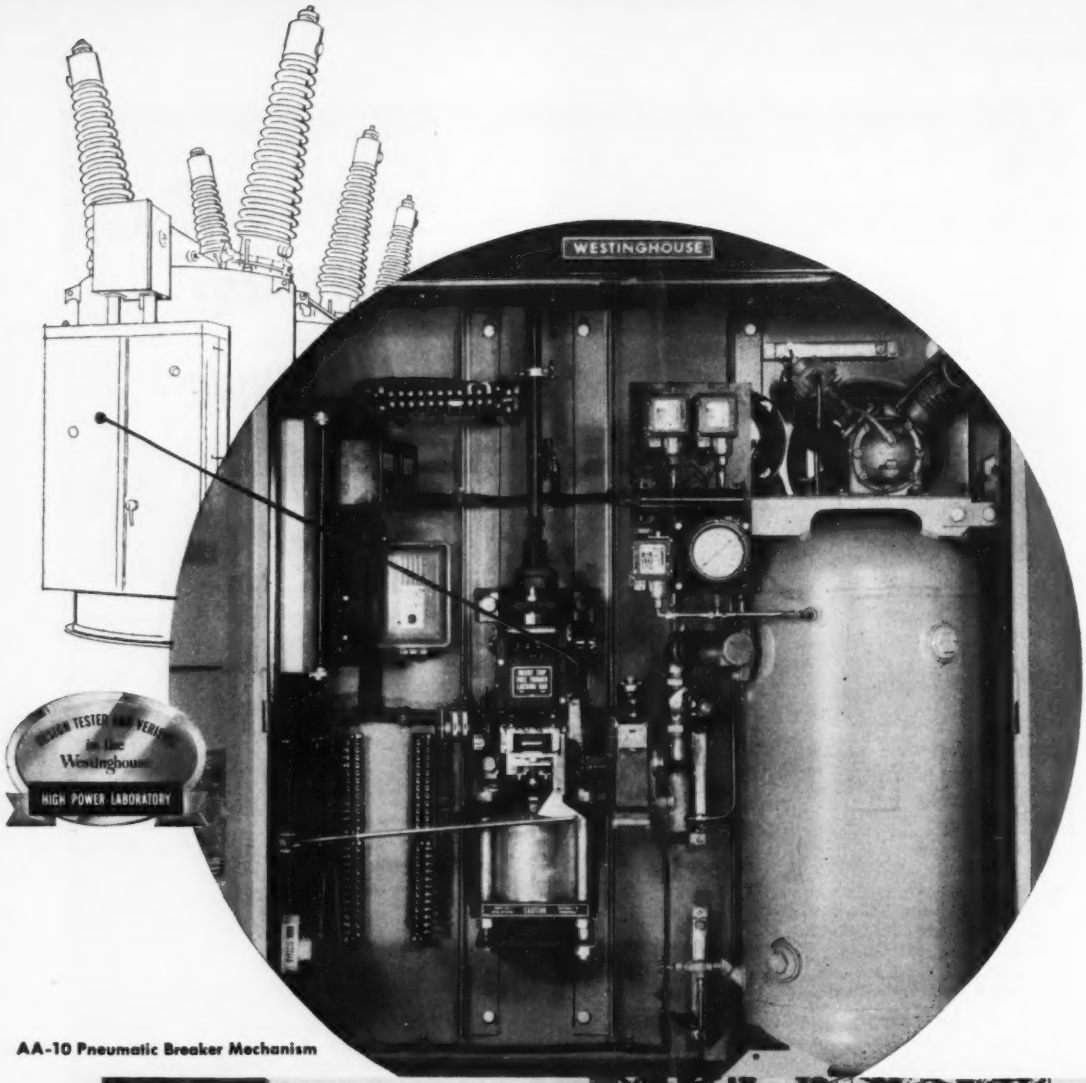
Coil ends lie *flat*. No burring or twisting of wire.

*T.M. Reg. U.S. Pat. Off.
†Patent Pending

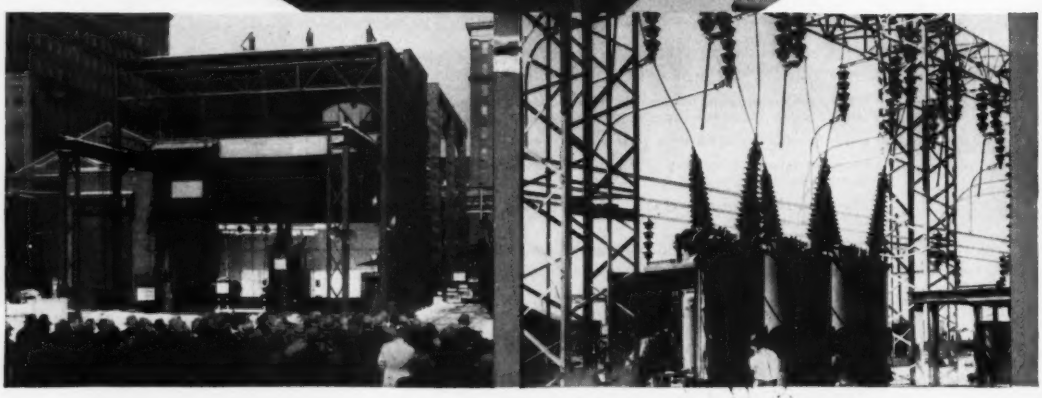
Driver-Harris Company
HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



AA-10 Pneumatic Breaker Mechanism



These breaker mechanisms, like every advance in Westinghouse apparatus design, have been proved in exhaustive tests in the Westinghouse High Power Laboratory.

This 10,000,000-kva, 161-kv, 3-cycle breaker is equipped with an AA-10 pneumatic mechanism, and arranged for 20-30-30 cycle multiple reclosing.

New Breaker Operating Mechanisms Combine High Speed Reclosing...and Mechanically Trip-Free Opening

Two pneumatic operating mechanisms—the AA-7 and AA-10—now handle the complete range of Westinghouse Oil Circuit Breakers, from 15 kv, 500,000 kva to 230 kv, 15,000,000 kva. They provide new standards of operation.

THE AA-10 MECHANISM IS . . .

Larger . . . more powerful to meet the closing requirements of today's highest rated breakers.

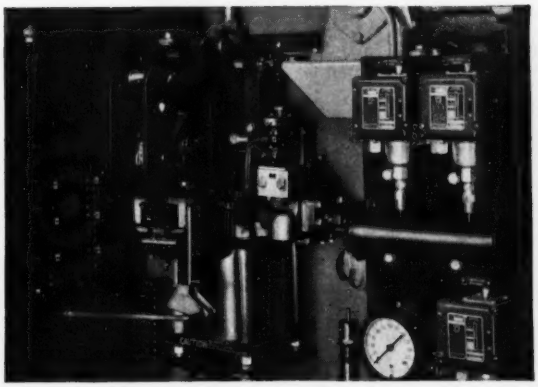
Selective . . . It trips mechanically trip-free whenever there is high-pressure air in the closing cylinder . . . contacts open unrestrained . . . never a drag from the closing piston. For high-speed reclosing, the mechanism trips non-trip-free . . . opens only part way and quickly recloses, greatly reducing stress on both the mechanism and breaker.

Unlimited Reclosing Possibilities . . . High-speed reclosing in 20 cycles, or . . . ultra-high-speed reclosing in 15 cycles or less, or . . . multiple high-speed reclosures.

THE AA-7 MECHANISM . . . Mechanically trip-free for all operations . . . meets the closing requirements of moderately loaded breakers and provides 20-cycle reclosing even after mechanically trip-free opening.

Proved Operation

Exhaustive tests in the Westinghouse High Power Laboratory and field experience on the largest breakers in service today are your assurance of perfect mechanism performance. For complete details, ask for Bulletin DB 33-125. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.



The AA-7 mechanism, like the AA-10, features roller-bearing latches, no adjustments, simplified air control, unrestricted access to all components.

See "Electrical Proving Ground"

The dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details see your Westinghouse representative, or write Westinghouse Film Division, P. O. Box 868, Pittsburgh 30, Pa. J-60782

ELECTRICAL PROVING GROUND

YOU CAN BE SURE... IF IT'S Westinghouse

POWER CIRCUIT BREAKERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

B-M *Fittings*

ARE APPROVED AS CONCRETETIGHT

When setting E. M. T. in concrete you can make each job easier and more profitable by using Briegel All Steel Indenter Fittings that have UL approval as CONCRETE-TIGHT. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job a better job. It is only natural that Briegel Fittings are the most widely used E. M. T. connectors and couplings.

Cross Section Showing Indentations.

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

Distributed by

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Pittsburg Standard Conduit Co., Pittsburgh, Penn.; Wagner Malleable Products Co., Decatur, Ill.; J. R. Richards Co., Carnegie, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.

ALLIS-CHALMERS
INSTRUMENT
TRANSFORMERS
Outdoor current transformer for heavy duty metering, Type KO. Ratings up to 15 kv and 800 amperes.
Outdoor potential transformer, 200 va, Type PWD. Ratings up to 15 kv.
Indoor potential transformer, 200 va, fused or unfused, Type PD. Ratings up to 14,400 volts.

Safety Factor *stepped up!*

BECAUSE OF THIS VACUUM-PRESSURE PROCESS

THE SPECIAL CHAMBER shown above houses a modern vacuum-pressure system for compound-filling Allis-Chalmers instrument transformers. Here the core-and-coil assemblies and compound become a compact unit—with all parts positively positioned for life. And because air and moisture are kept out permanently, insulation strength is retained almost indefinitely.

Here's How It Works

When the door is closed on the core and coil assemblies (preheated before they are placed inside), a combination of high vacuum and Sahara-like heat whisks away all moisture and entrapped air. Soon the assembly is bone dry. Then hot liquid compound—from which air and moisture are removed—is directed into the transformer case. When case is full, vacuum is released. The hot compound is forced into the innermost recesses of the tanked assembly, completely filling all voids. The transformer is then removed to another area for cooling and final finishing.

You Get 4 Big Benefits

The Allis-Chalmers method of compound-impregnating results in a higher safety factor for your instrument transformer . . . giving you these four advantages:

1. High dielectric strength
2. Air and moisture cannot attack insulation
3. Eliminates maintenance of an insulating medium
4. No leakage or contamination

The extra benefits resulting from this compound-impregnating process can save you money. Why not contact your nearby Allis-Chalmers district office today for more information. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A 3742

ALLIS-CHALMERS

steel clad wiring systems
offer protection...security...
permanence unequalled by
any other system

specify

steel clad wiring systems

for all installations

they provide:

- Protection against shock. Steel raceways are completely grounded systems.
- Protection from external mechanical damage to prevent time-consuming breakdowns.
- Protection against moisture.
- Protection against corona cutting and breakdowns on high voltage work.
- Protection against fire hazards.
- Protection against tampering.

steel for permanence...
grounded for safety

save time and money with

...the complete, ready-to-use,

ABC is the *fastest* type steel clad system to install.

Easiest to handle . . . Easy to carry.

Wires and raceway are installed together.

One piece from outlet to outlet.

No special tools . . . No waste . . . No threading . . . No coupling.

ABC CABLE

steel clad wiring system

plus these extra ABC features

Anti-Short Bushing—Protects wires from armor edges.

Direc-Safecote—insulated wires, flame retardant, moisture resistant, easy to strip.

2 Double Paths to Ground on Sizes No. 14 and No. 12—(1) Flat grounding strip for continuous low-resistance path (2) Armor, with "bondhook" channel construction, assures positive ground.

Other National Electric Steel Clad Wiring Systems

Conduit Systems

SHERARDUCT

XDUCT JUNIOR

FLEXSTEEL

NEPCODUCT

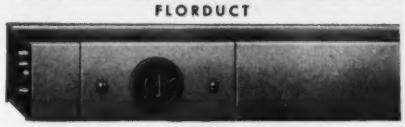
Surface Raceway Systems

4 x 4 WIREWA

XTENSIONDUCT

METAL MOLDING

FLORDUCT



SURFACEDUCT

"PLUG-IN" STRIP

Busway Systems

I.P.I. "PLUG-IN" BUS

"LO-LOSS" FEEDER BUS

Listed by Underwriters' Laboratories, Inc. Sold through leading electrical wholesalers. For complete information, write to National Electric Products Corporation, 1308 Chamber of Commerce Bldg., Pittsburgh 19, Pa.

EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

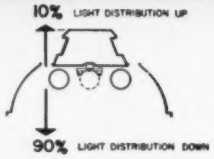
3 PLANTS • 6 WAREHOUSES • 42 SALES OFFICES

5 REASONS WHY
New CFI DAY-LINE
Guarantees More Comfortable, More Productive Plant Lighting

To give industry the comfortable, vision-saving illumination it needs, Day-Brite has completely redesigned its famous Day-Line industrial line. Now—for the first time—industry can have the strong, sturdy construction it needs plus the most important advance in plant lighting in years—10% upward component to provide "comfort for industry."

CFI MEANS COMFORT FOR INDUSTRY

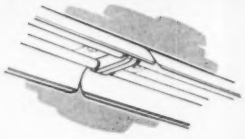
These Features Make the Difference!



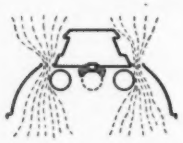
10% UPWARD LIGHT—Eliminates harsh brightness contrasts and dark ceilings that can result in irritation or nervous fatigue due to eyestrain. Workers see better, produce more. Two years of exhaustive research by Day-Brite engineers have proven 10% upward, 90% downward distribution of light is the most practical for industrials.

ALL-WHITE PORCELAIN ENAMEL REFLECTORS—Outside as well as inside—further improve the efficiency of the upward component. Embossed apertures are scientifically sized and placed to achieve 10% upward light distribution and still retain the famous Day-Brite strength and rigidity needed for the toughest installation conditions.

LOWER COST—Yet with all the advantages you get with the new CFI DAY-LINE, prices are substantially lower! Better lighting at less cost! Day-Brite Lighting, Inc., 5412 Bulwer Avenue, St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.



VIBRATION-PROOF TURRET* SOCKETS are standard on all CFI DAY-LINE industrials, including the 85-watt fluorescent lamp units. These finest of all heavy-duty sockets give you positive lamp seating and allow trouble-free lamp mounting. Servicing is quicker and easier.
* ® G. E. Co.



COOLER, CLEANER PERFORMANCE—Constant air-flow through the apertures, around the lamps, and over the inside and outside of the reflector keeps CFI DAY-LINE fixtures cooler, more efficient . . . and reduces light loss due to dust and dirt deposits. Circulating air keeps reflectors cleaner . . . longer.

Distributed Nationally by Leading Electrical Wholesalers

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE:

DENVER, COLO.
C. D. Belt & Co.
1921 Blake St.

LOS ANGELES 21, CALIF.
M. J. Rudman
1206 Long Beach Avenue

PHOENIX, ARIZ.
E. B. Bomar
P. O. Box 1602

PORTLAND, ORE.
R. M. Camnitz
P. O. Box 4166

SALT LAKE CITY, UTAH
Mark Bryner—Thermal Engineering Co.
P. O. Box 446

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Thermal Engineering Co.

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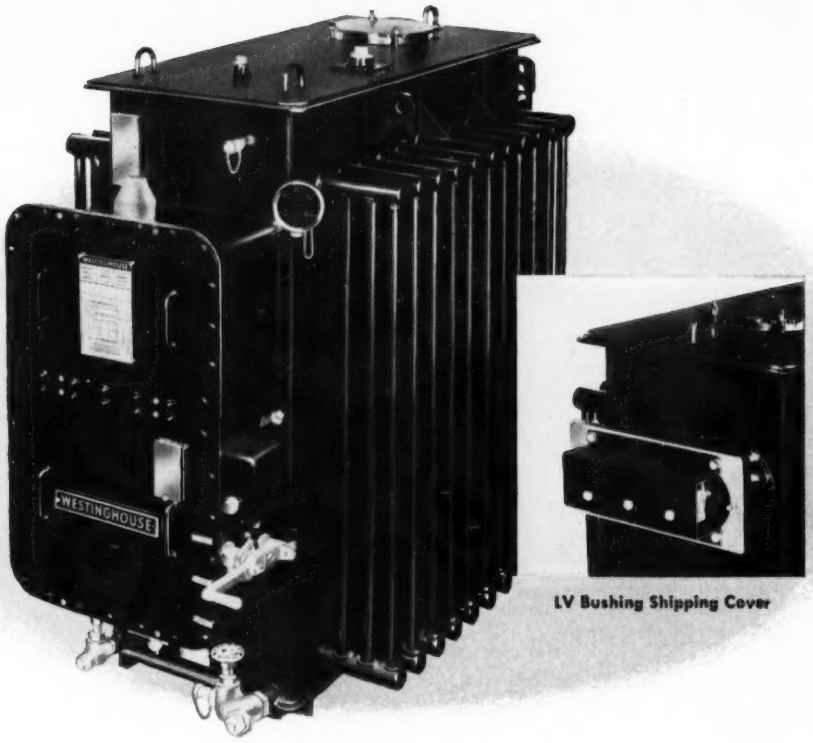


LV Bushing Shipping Cover

QUALITY in the transformer ADDS RELIABILITY to the network

Everyone agrees that when you install a network system, you install *the best* for reliability and service continuity.

But the degree of reliability...or, more exactly, the freedom from maintenance, depends directly on quality in the transformers.

That's why Westinghouse Network Transformers have continuously wound coils of sliverless copper, to guard against hot spots, crystallization and pricked or scored insulation. That's why they're high-frequency tested, too.

In addition, Westinghouse Transformers are filled under vacuum, and have welded-on covers to assure a perfect seal. Finishes are not only baked for longer life, but bases are undercoated.

There are many other features such as the LV bushing shipping cover, shown above, that assure safe delivery of the quality built into Westinghouse Network Transformers. Your Westinghouse representative will be glad to give you full information, or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70646

YOU CAN BE SURE...IF IT'S

Westinghouse

NETWORK TRANSFORMERS

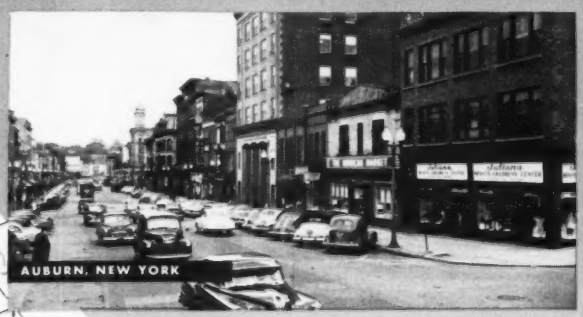
NETWORK SYSTEMS PAY... IN *NEW YORK STATE!*

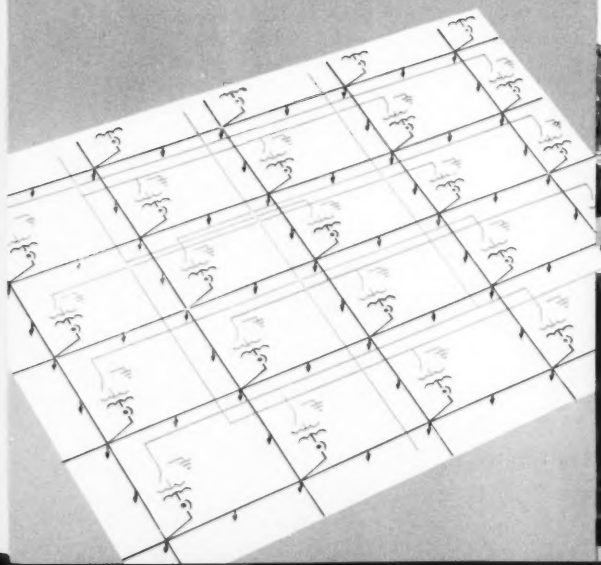
BINGHAMTON converted from an overhead to an underground (radial) system in 1921. Change-over to network was accomplished between 1940 and 1945 without disrupting existing service. Load on the original network area was approximately 3,600 kva. By 1951, normal growth and some expansion of the area served had increased the network load to 6,000 kva. Further load growth, currently running 8-10%, will bring the load to 7,200 kva by 1954.

ELMIRA'S network is now in operation and the 1,300-kva load, including heavy air conditioning, is growing rapidly. A 10% increase in this load is expected by the end of 1952.

AUBURN'S network will be complete by 1953. Initial load will be approximately 2,500 kva and rate of growth is estimated at 5 or 6% per year. Serious voltage problems will be corrected by this installation.

LOCKPORT'S underground network will be complete in 1952 with a load of 1,500 kva. Congestion of overhead system and lack of room for expansion dictated an underground network.





4 more cases where networks met growth problems

New York State Electric & Gas Corporation serves an area embracing about 35% of New York state, covering 16,700 square miles in 43 counties. This is the home of some 1,400,000 people, and a widely diversified group of industries. To keep ahead of the actual electrical needs of this rapidly growing area requires constant and careful planning.

NETWORK PLANNING STARTED IN 1939... this utility was faced with numerous interruptions caused by cable burn-offs, and unbalanced voltage and current conditions in the secondary distribution system. To correct these conditions, and at the same time prepare for sizable load growth, the A-C Secondary Network offered the most flexible, economical, long-range solution.

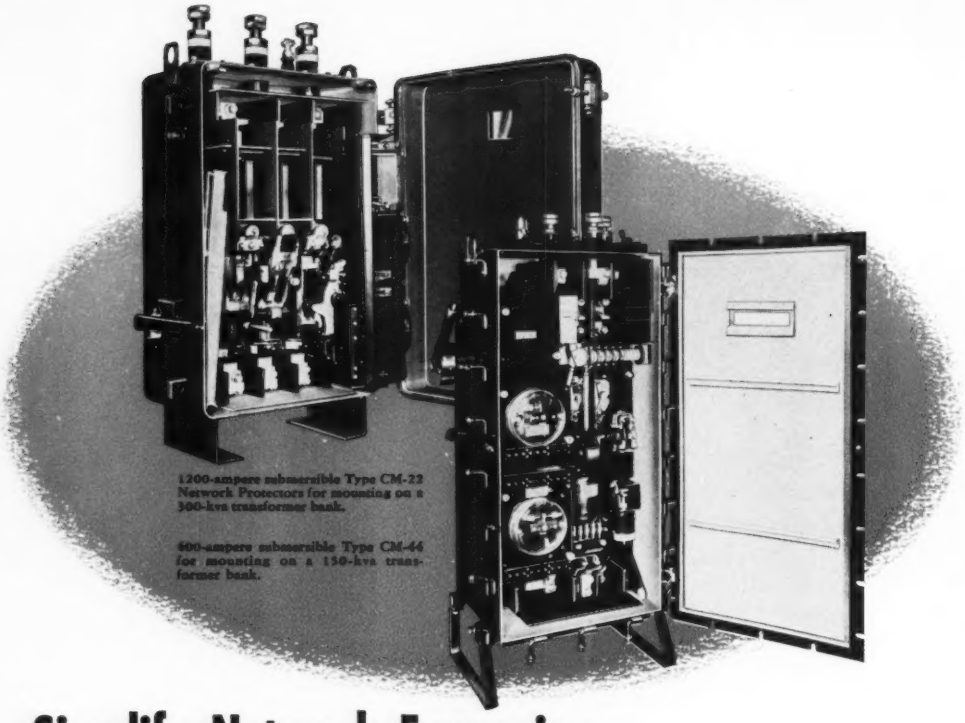
TODAY, New York State Electric & Gas Corporation measures the effectiveness of its A-C Secondary Network installations in ability to handle greatly increased load with improved reliability and quality of service. At the same time, the networks have eliminated duplicate services, separate substations previously required, and have materially reduced maintenance expense. They enjoy interchangeability of uniform equipment, too. Since the first network installation in Binghamton, others have been added in Elmira, Auburn, Lockport; and still other cities in the system are now being considered for network service.

THE RANGE OF WESTINGHOUSE NETWORK EQUIPMENT enables you to employ the type of system best suited to your local problems. Booklet B-4002 contains complete information about the flexibility and advantages of the A-C Secondary Network System. Our system planning facilities are at your service. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-97166

YOU CAN BE SURE...IF ITS

Westinghouse

NETWORK EQUIPMENT



1200-ampere submersible Type CM-22 Network Protectors for mounting on a 300-kva transformer bank.

600-ampere submersible Type CM-44 for mounting on a 150-kva transformer bank.

Simplify Network Expansion with Westinghouse NETWORK PROTECTORS

You can expand your network system simply—and economically—with Westinghouse Network Protectors. The reason—Westinghouse heavy-duty and medium-duty protector use the same relays. Hence, as load grows medium-duty (CM-44) protectors can be replaced with heavy-duty (CM-22) protectors and suitable transformers—*without upsetting system co-ordination!* CM-44 units may then be moved to lighter load areas.

Keep this important Westinghouse feature in mind as YOU plan your network system. It's a *sure* way to provide for simple, low-cost expansion of that system when load conditions dictate.

Ask your Westinghouse representative for further information . . . or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-60778

ONLY WESTINGHOUSE NETWORK RELAYS . . .

- Eliminate gears that cause friction and wear.
- Have a sensitive reverse-current setting that can be varied from .1% to 10% of the network protector rating.
- Have bearing surfaces readily accessible for inspection and cleaning.
- Have relay terminal screws that eliminate the need for additional testing facilities in the control wiring.
- Provide a nonsensitive relay that permits sensitive tripping after a time-delay.

YOU CAN BE SURE . . . IF IT'S

Westinghouse

NETWORK PROTECTORS

We have an army in the field

BELL SYSTEM communications for the powerline industry are guarded constantly by an army of trained specialists in the field. That's one of the big advantages in using Bell System communication services. This army is on the job to keep your service in operation 24 hours a day, 365 days a year.

The knowledge and skill of these and other Bell System technicians are the result of more than 75 years of experience in communications — experience that will give you good, dependable, economical communications for all of your needs.

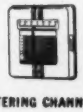
We provide — by radio, wire or cable — a wide variety of services. They include private-line telephone, mobile telephone, and teletypewriter services, and channels for remote metering, supervisory control, facsimile and other signaling.

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

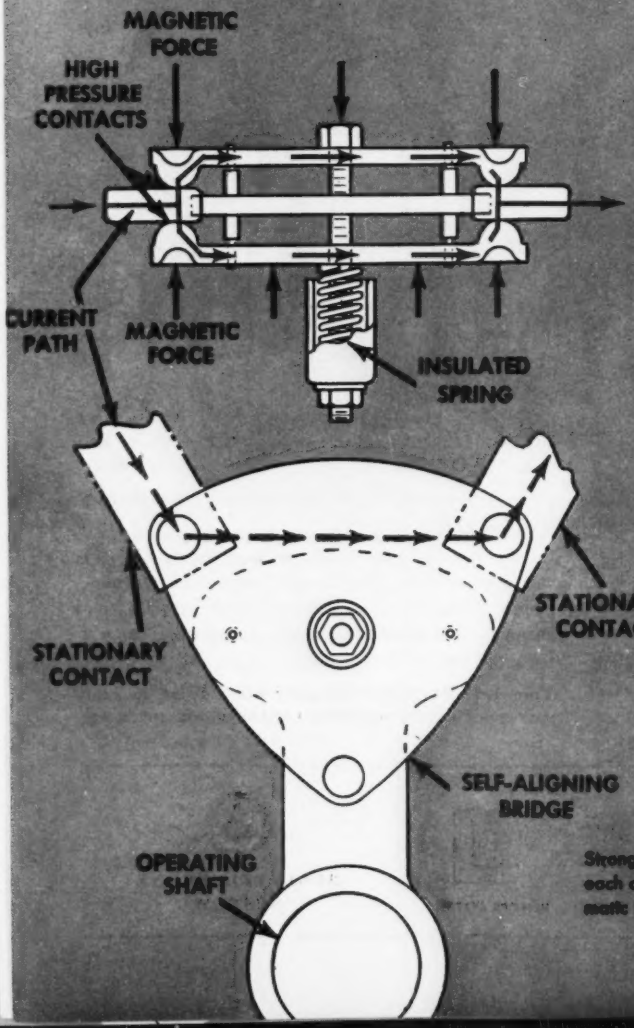


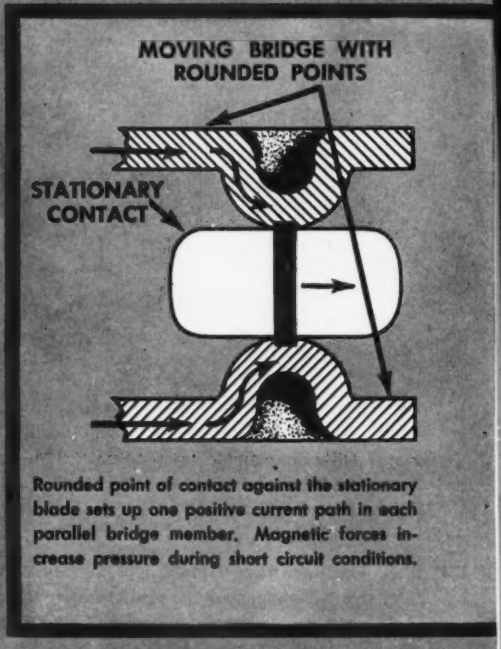
METERING CHANNELS

BELL TELEPHONE SYSTEM

new tap changer design

MAINTAINS TRUE CONTACT ALIGNMENT





Rounded point of contact against the stationary blade sets up one positive current path in each parallel bridge member. Magnetic forces increase pressure during short circuit conditions.

Strong, flexible spring action maintains equal pressure on each corner of the triangular bridging parts for perfect automatic tap changer alignment.

Uses New Contact Principle to Assure Cool, Long-life Operation on Allis-Chalmers Power Transformers

HERE'S A NEW TAP CHANGER for de-energized operation, using a new contact principle that keeps it cool in operation and extends operating life. Designed for use on Allis-Chalmers power transformers, the tap changer meets the approval of utilities which have sought an improved tap changer performance. It helps Allis-Chalmers power transformers do a good job better.

Here's How It Operates

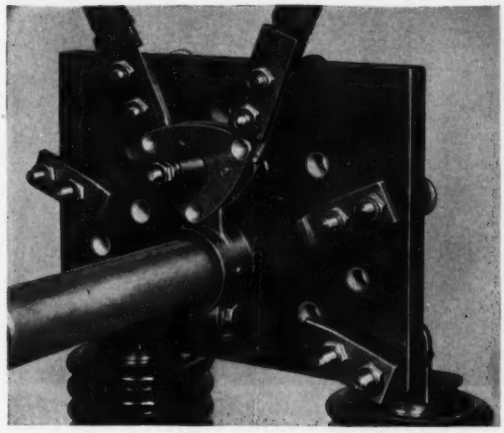
A positive, fixed current path established under high unit pressure is the basic design principle of the new tap changer. Two sets of rounded contact points establish a low-resistance path when they meet the flat stationary contacts on the tap changer panels. A strong wiping action thoroughly cleans contacts whenever tap positions are changed. And elimination of carbon formation adds years to tap changer service life and lowers contact resistance.

Equal Contact Pressure

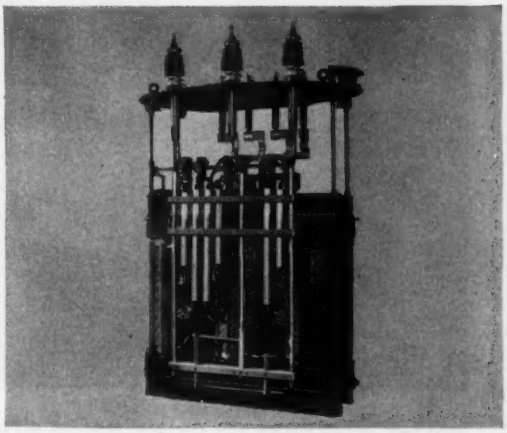
The movable contact bridge is designed so that the current travels through parallel members between the stationary contacts. This creates magnetic forces that prevent "throw open" action when a short circuit occurs on the system.

To maintain equal pressure at points of contact, flexible spring action operates between fixed limits. And the self-aligning bridge arrangement assures automatic and true alignment for each operation.

If you haven't seen the technical sheet describing the tap changer in greater detail, get one from your local A-C representative today or write Allis-Chalmers, Milwaukee 1, Wis.
A-3755



Rounded edges and insulated parts of the tap changer assembly reduce voltage stresses and minimize corona. Oil leakage holes prevent air pockets around mounting bolts.



The new tap changer is easily accessible for periodic inspection through the cover handholes. Tap positions are changed in all phases simultaneously.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

You should expect the best value from G-E fluorescent lamps

WATER TOO PURE TO DRINK HELPS GIVE YOUR CUSTOMERS MORE LIGHT. It's the water on the *right* you wouldn't want to drink. It's so pure it's tasteless. You'd prefer the water on the left. Ordinary tap water, it's safe enough for drinking. But not for G-E fluorescent lamps. A chemical reagent shows mineral impurities. If they got into the phosphor coating, they would cut light output. On the glass tube, they would create a streaked look. So General Electric uses the specially ultra-deionized water shown at right in making our phosphors and to wash our lamp tubes. It's twice as free of minerals as distilled water. A small precaution — perhaps. But it helps give your customers more light and better looking lamps. It's another reason why you and your customers *should* expect the best value from G-E fluorescent lamps.

You can put your confidence in

GENERAL ELECTRIC

IMPROVED THERMAL RESISTANCE WITH

VICTOR PURIFIED PORCELAIN

TRANSMISSION PINTYPES!

VICTOR NO. 245 TRANSMISSION PINTYPE

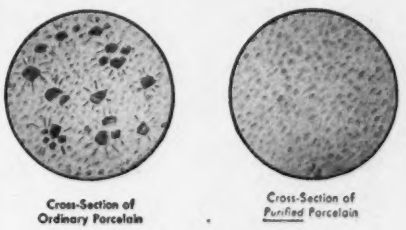
For complete engineering data on this insulator and other sizes and types, send today for Bulletin No. 4.

More Uniform Thermal Expansion Achieved

VICTOR *Purified* Porcelain has the most uniform thermal expansion ever achieved in the insulator field—expansion that remains uniform throughout its entire mass. This achievement, like *Purified* Porcelain's many other advantages, is due to the removal of all mineral salts from the water used in processing.

With VICTOR *Purified* Porcelain, failure of shells due to sudden thermal changes is eliminated. Choose VICTOR TRANSMISSION PINTYPES—made of *Purified* Porcelain—finest insulator porcelain ever made!

VICTOR INSULATORS, INC. VICTOR, N. Y.



Cross-Section of Ordinary Porcelain

Cross-Section of *Purified* Porcelain

Here's Why *Purified* Porcelain Has Uniform Expansion

The drawing at the left shows a greatly enlarged section of ordinary porcelain and reveals what ceramic authorities agree contributes to porcelain weakness and possible failure under unusual service conditions. The various irregular shapes are glass-like impurities which are formed during firing, by mineral salts in the processing water. After firing, these impurities shrink at a different rate than does the porcelain itself, causing tiny fissures (shown by the dark radiating lines) which physically weaken the insulator and make it more vulnerable to puncture. Also, these differing rates of thermal expansion set up dangerous strains and stresses during sudden temperature changes in service that can actually weaken the insulator.

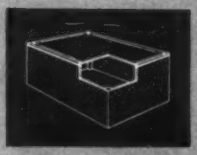
The drawing at the right shows the homogeneous quality of *Purified* Porcelain. Its absence of impurities gives uniform thermal expansion and lessens the possibility of failure under extreme conditions. Other advantages: maximum density and hardness, higher mechanical impact values, improved range of M and E strength values and higher oil puncture values!

Specify VICTOR TRANSMISSION PINTYPES

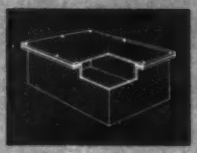
STANDARD | CUSTOM

...CAST BOXES* BY HOPE

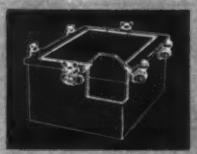
STANDARD TYPES & SIZES



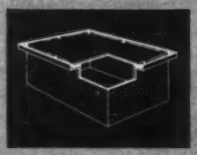
UNFLANGED BOXES
H1200 Type
144 sizes
from 4 x 2 x 2 to 48 x 36 x 17



FLAT FLANGED BOXES
H8000 Type
87 sizes
from 4 x 4 x 3 to 36 x 36 x 12



HINGED COVER BOXES
H3200 Type
128 sizes
from 3 x 5 x 3 to 36 x 36 x 12



FLANGED RECESSED COVER BOXES
H7000 Type
51 sizes
from 4 x 4 x 3 to 30 x 24 x 12

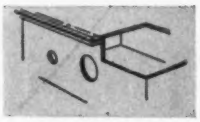
CHECKERED COVER SIDEWALK BOXES
H3800 Type
33 sizes
from 6 x 6 x 4 to 36 x 24 x 14

STANDARD BOXES are of strong, dense cast iron—hot dip galvanized for long service and attractive appearance. Weatherproof construction—rubber-gasketed closures prevents entry of rain, snow, sleet or dust under normal conditions.

CUSTOM VARIATIONS

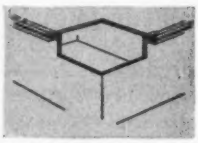
You can specify any of these modifications in standard BOXES by HOPE —have them factory-made at moderate cost—and get prompt delivery.

DRILLING—
or drilling and tapping—
of conduit entrances

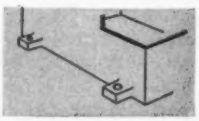


BOSSES—
to provide extra thickness
for five-thread conduit entrances.
Drilled and tapped to specification
if desired

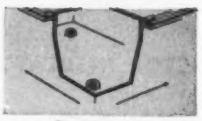
SPECIAL GASKETS —
Neoprene for fungus resistance in hot, humid climates • pure gum for extreme softness and resistance to special acids • Vellumoid for resistance to oils and fats • graphite-free compressed asbestos for installation near boilers or steam pipes



MOUNTING LUGS—
drilled for any desired
bolt size



INTERIOR MOUNTING BUTTONS—
—tapped blind
to specified centers



AND . . . you can order these custom modifications, as well as standard BOXES by HOPE, conveniently and quickly, through your local electrical distributor.

*** OUTLET BOXES AND FITTINGS • JUNCTION AND PULL BOXES • HINGED CABINETS • TERMINAL BOXES • EXPLOSION HOUSINGS**

HOPE
ELECTRICAL PRODUCTS CO., INC.
338 Wilson Avenue, Newark 5, N. J., Mitchell 2-4426

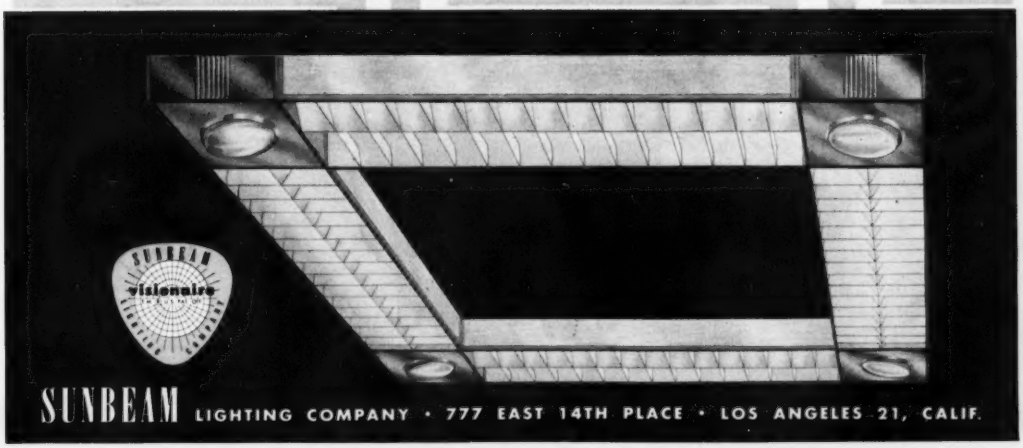
EXPLOSION HOUSINGS BY HOPE

have been extensively used in Class 1, Groups C and D hazardous locations, such as chemical, petroleum and powder plants, pump rooms and paint plants.

GET THE FULL STORY ON BOXES BY HOPE —
WRITE ON COMPANY LETTERHEAD FOR CATALOG

LIGHT PATTERNS AS VARIED AS NATURE

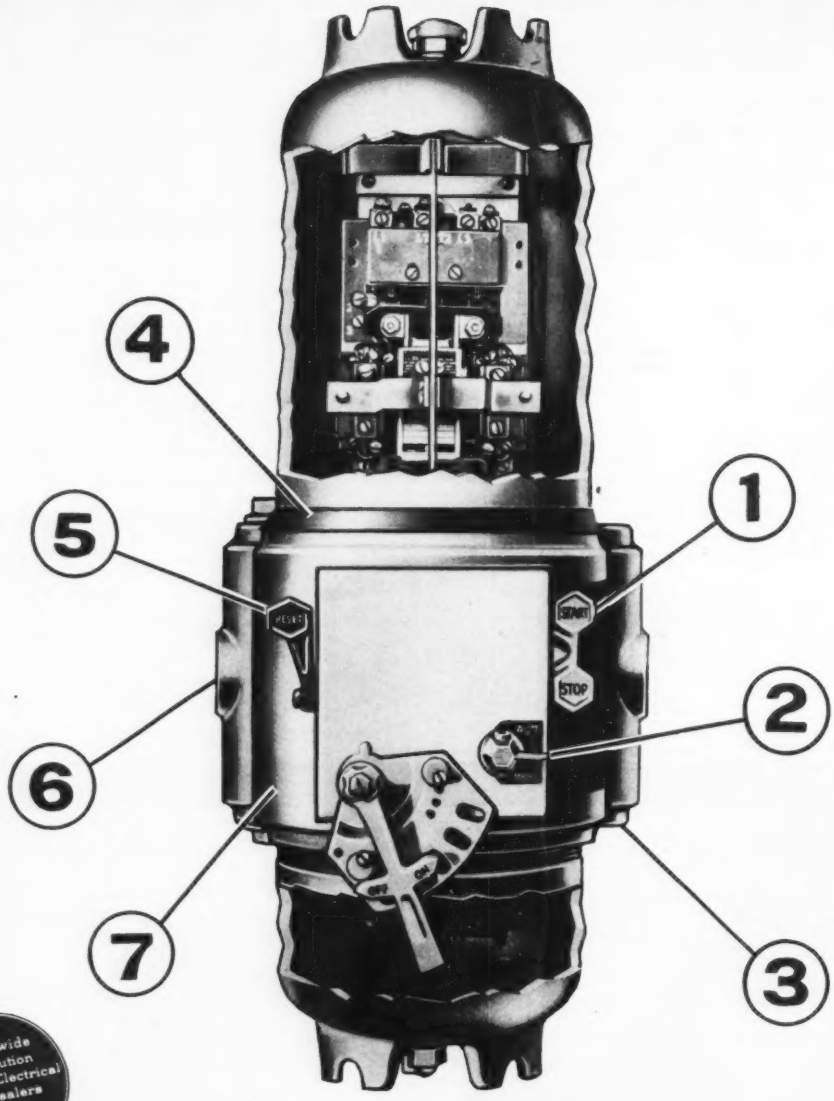
Versatility and shallowness are designed into this new Sunbeam Visionaire, the L1780 Series. Because of its shallow, 4⅛" depth, it may be mounted flush on the ceiling, providing better lighting in low ceiling areas. Pendant mounted in high ceiling areas, illumination at maximum efficiency is achieved. Used in conjunction with spotlights (for warm hues), an endless variety of patterned arrangements is possible for large offices, stores, lobbies and public buildings. Available in fluorescent and slimline, 48", 72" and 96" nominal lengths. Write today for bulletin No. 684 for complete information.



SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIF.

7 important NEW features

... to the many basic advantages of



A Nationwide Distribution Through Electrical Wholesalers

CONDULETS • TRAFFIC SIGNALS

have been added CROUSE-HINDS Type EPC motor starter and circuit breaker CONDULET *

You get all of them on the Model M52

Model M52 EPC is the most flexible explosion-proof line starter and circuit breaker enclosure ever produced. The addition of 7 new features to the proven basic advantages of the EPC construction assures the greatest ease of installation and maintenance.

The exclusive basic advantages of the EPC Condulet have made it the world's leading enclosure for housing motor starters, circuit breakers and combinations for use in hazardous locations.

The basic advantages are:

EASY INSTALLATION . . . The use of a strong light-weight aluminum alloy and the unique three-section design makes it practical for an electrician and his helper to install the largest housing without the use of costly lifting equipment. The internal devices can be easily removed for pulling in the wires.

THREADED JOINT CONSTRUCTION . . . All joints are threaded. All operating shafts and bushings are thread-in-thread construction. This insures maximum safety, easy inspection and maintenance, and maximum corrosion protection.

FLEXIBILITY . . . A large number of different enclosures can be assembled from the wide variety of sizes of bodies and covers. They are not only used for circuit breakers and starters but have proven adaptable for many other types of electrical equipment. The body has numerous conduit hubs for flexibility of installation.

COST AND TIME SAVINGS . . . The outstanding advantages of the unique EPC Condulet over conventional explosion-proof enclosures all add up to lower installed cost and lower maintenance cost.

All of these advantages have been available for years.

Now Crouse-Hinds offers you 7 new improvements to underline the basic advantages of type EPC Condulets and to save you more dollars and more man-hours than ever before.

1. **Built-in Push button stations** available on line starters and combinations of line starters with circuit breakers — START — STOP, FOR — REV — STOP and HIGH — LOW — STOP stations for regular, reversing, or two-speed starters.
2. **Built-in selector switch** is available on line starters and combinations of line starters with circuit breakers. Normally supplied marked HAND — OFF — AUTO or JOG — RUN — OFF, three-position style. Two-position selector switch or combinations of selector switch with START — STOP station can be supplied.
3. **Back conduit entrance** can be supplied by drilling and tapping the boss in the center of the back . . . in addition to the four regular top and bottom hubs.
4. **Protective Neoprene gasket** is available for the upper cover joint. Where EPC Condulets are exposed to unusually severe weather or corrosive conditions, this gasket provides additional protection.
5. **A new RESET lever with threaded shaft,** rotating within a threaded bushing, provides easier and more positive operation of the reset mechanism.
6. **Horizontal through-feed conduit entrances** are provided by drilling and tapping bosses on the sides of the Condulet body.
7. **Greater ease in wiring** is provided by increased height in the center body section and by universal use of open framework mountings for circuit breakers and starters in the new model M52 EPC Condulets.

Model M52
Type EPC Explosion-Proof Condulet in 7, 9, and 11-inch body sizes

Send for YOUR copy of Bulletin 2634 →

*CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

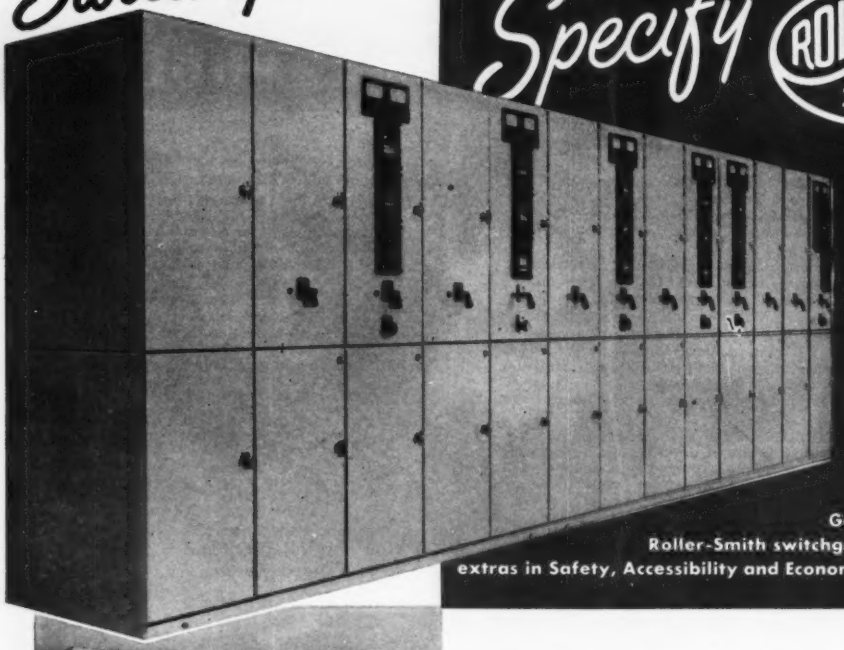
OFFICES: Albuquerque — Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Tulsa — Washington. RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

AIRPORT LIGHTING • FLOODLIGHTS

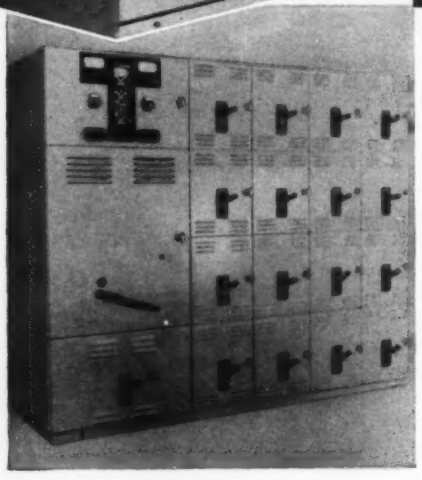
in Switchgear...

EXTRAS COUNT!

Specify ROLLER SMITH



Get *all the extras*
Roller-Smith switchgear provides . . .
extras in Safety, Accessibility and Economy of operation.



● **SAFE** All equipment is metal enclosed . . . weather proofed when required . . . built to NEMA and AIEE standards for safe, dependable performance. The "up-to-the-minute" design of Roller-Smith switchgear assures *extra* safety for operators.

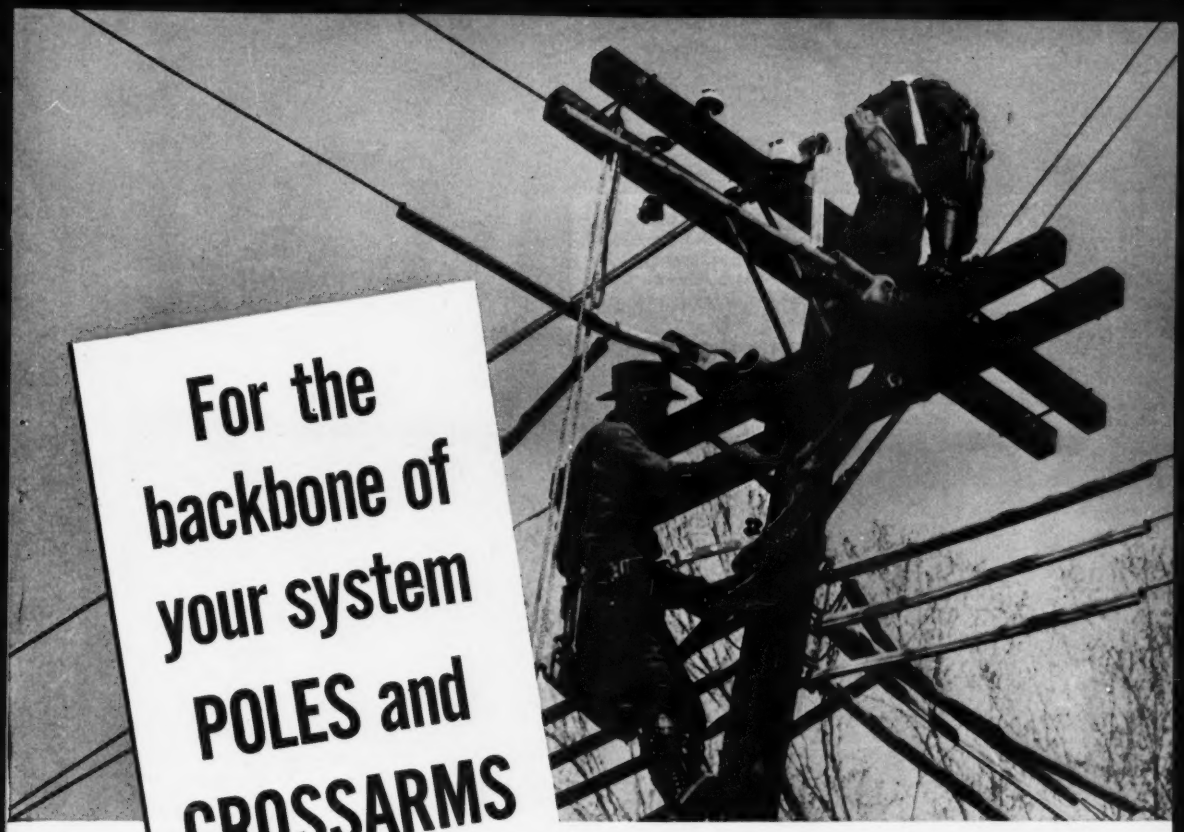
● **ACCESSIBLE** All sections of RS switchgear are easily accessible for quick inspection and adjustment. This cuts maintenance time to a minimum . . . makes it easier to do a thorough job.

● **ECONOMICAL** All Roller-Smith equipment is precision-built according to your specifications . . . tested *before* you get it. When you specify Roller-Smith, you can count on *extra* long, trouble-free operation with less "down time" for repairs.

Consult your nearest Roller-Smith representative, or write to us for catalogs which fully illustrate and describe our complete line of low voltage draw-out; moderate duty, vertical lift Metal Clad; and heavy duty Metal Clad switchgear.

ROLLER-SMITH CORPORATION
Bethlehem, Pennsylvania

ROLLER SMITH



For the backbone of your system POLES and CROSSARMS

Via GraybaR

The pole-line backbone that supports today's essential power lines needs seasoned strength and durability to do its job efficiently and at low maintenance cost.

That's one reason why power companies all over the nation choose Graybar for all their pole-line needs. They know that Graybar-distributed materials are always right for the job and stand up under abnormal stress of storms, ice, and snow.

POLES—Differing conditions lead to different local preferences. That's why Graybar distributes *all* types of poles—full-length, pressure-treated Southern Pine . . . full-length, pressure-treated Fir and Cedar . . . butt-treated Northern and Western Cedar.

All treated poles are carefully selected and processed to provide maximum strength and durability—plus the clean, smooth exterior surface required for city use.

CROSSARMS—Douglas fir crossarms via Graybar are selected and seasoned under rigid methods—are strong, long-lasting, and provide a wide margin of safety in the line.

POLE-LINE SUPPLIES—Graybar also distributes insulators, wire, cable, strand, hardware, tools, and hundreds of other needed pole-line supplies—all products of outstanding manufacturers.

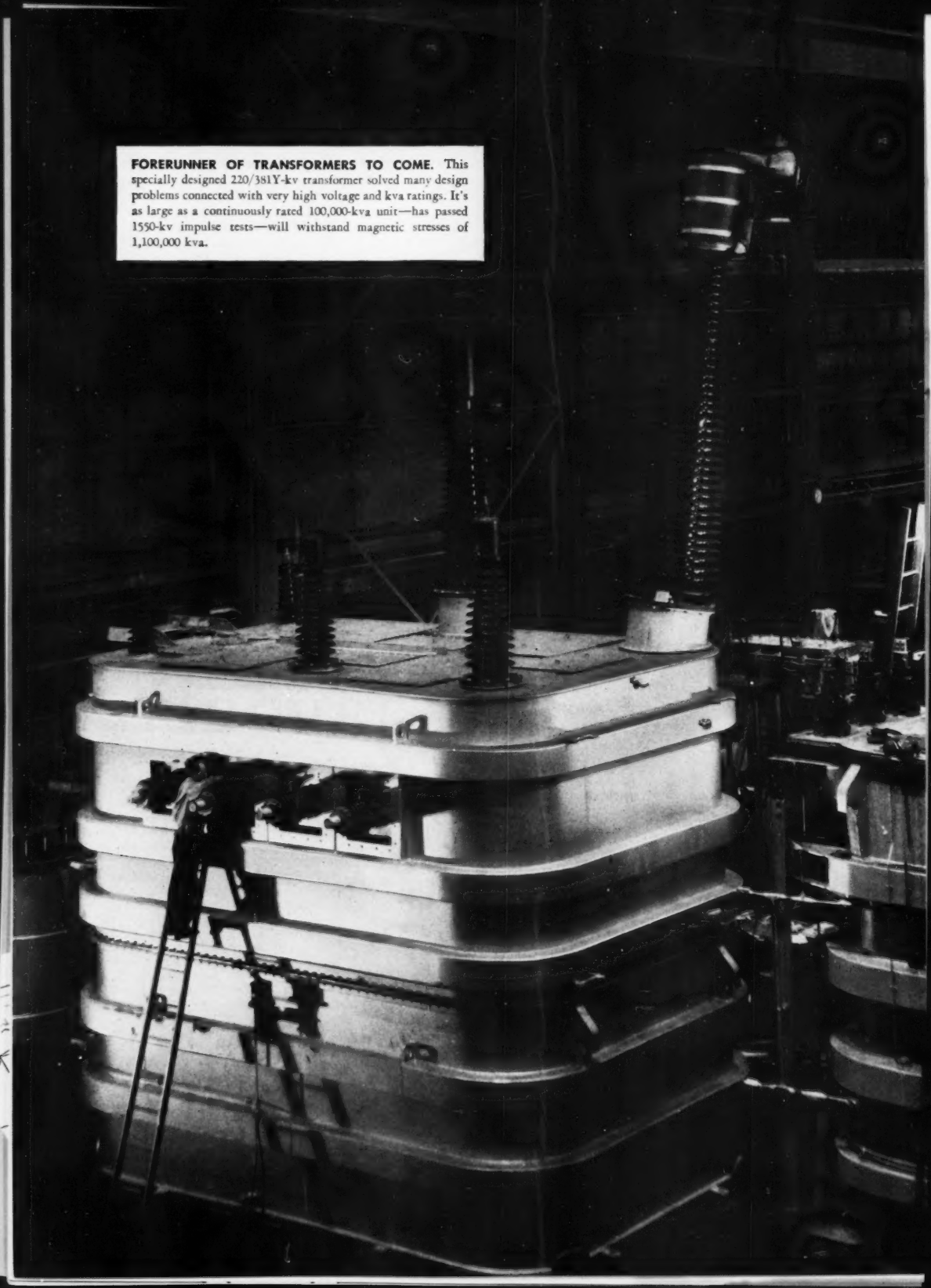
To keep the backbone of your system strong, order your supplies from Graybar. You'll always get dependable items, and the nationwide Graybar warehouse system helps assure the *fastest possible* deliveries under today's uncertain conditions.

Because Graybar is wholly owned by its operating and retired personnel, you can always expect an extra measure of personal interest in serving you. Feel free to call your local Graybar Representative for information on any electrical item . . . call your nearby Graybar Outside Construction Specialist for planning aid and technical advice. *Graybar Electric Company, Inc. Executive Offices: Graybar Building, New York 17, N. Y.*

48-88

Everything for your pole lines
Via GraybaR

IN OVER 100 PRINCIPAL CITIES



FORERUNNER OF TRANSFORMERS TO COME. This specially designed 220/381Y-kv transformer solved many design problems connected with very high voltage and kva ratings. It's as large as a continuously rated 100,000-kva unit—has passed 1550-kv impulse tests—will withstand magnetic stresses of 1,100,000 kva.

"CONCENTRIC LAYER" transformers withstand short-circuit forces of 1,100,000-kva duty

Units, impulse-tested at 1550 kv full wave, are installed in General Electric's new Switchgear Development Laboratory at Philadelphia.

Transformers for repeated short-circuit duty. Two 220,000/381,000Y—7750/15,500-volt transformers, connected to special short-circuit generators, supply the power that permits the new Switchgear Laboratory to simulate actual system faults. Each transformer can deliver 1,100,000 kva for a period of 10 cycles . . . and repeat this performance 15 times an hour.

"Concentric layer" winding solves short-circuit problems. The extremely severe duty requirements of these transformers were readily satisfied by the "concentric layer" winding. In this design, the conductor is wound in successive layers arranged concentrically and connected in series.

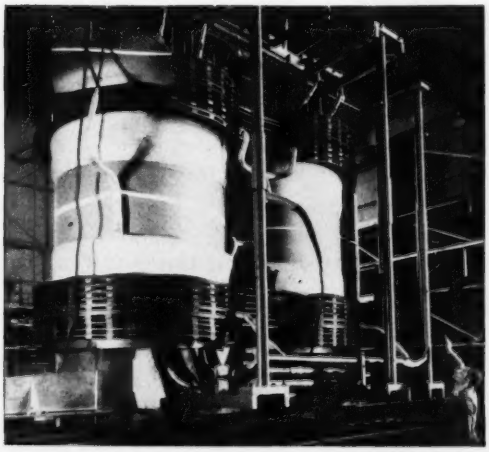
High short-circuit strength is inherent since major magnetic forces (as high as 2800 tons) are radial and well within both the tensile strength of the high-voltage conductors and the compressive strength of the cylinder on which the low-voltage coil is wound.

Impulse strength to withstand 1550-kv test was achieved readily with the "concentric layer" design. Voltage stress between layers is limited to the voltage of one layer since adjacent layers are connected in series.

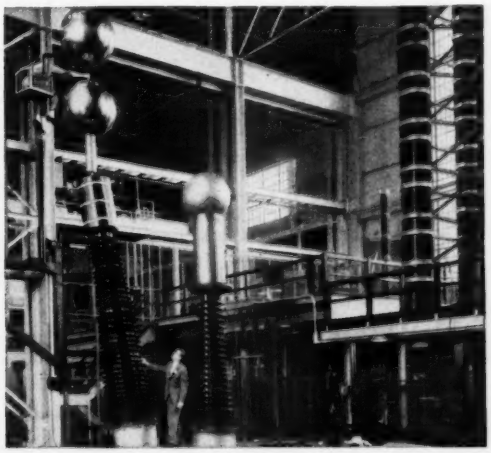
The cylinders of insulation between the layers are flanged over the ends of the winding to eliminate creepage in the direction of high electrical stress.

Uniform distribution of impulse voltages throughout the windings is assured by complete electrostatic shielding.

"Concentric layer" transformers for your system. These testing transformers, while designed to meet unusual requirements, demonstrate the excellence of "concentric layer" windings for high-kva, high-voltage service. If you are using or contemplating voltages 161 kv and above, you may wish more information on this design. Ask your local G-E apparatus sales representative for Bulletin GER-129, or write Section 401-31, *General Electric Co. Schenectady 5, New York.*



INHERENT SHORT-CIRCUIT STRENGTH of "concentric layer" design is even greater in these transformers because windings are tighter, more compact. Internal cooling ducts could be omitted since a continuous rating was not required for intermittent test operation.



282% OF RATED VOLTAGE. Test man sets 100 CM gaps for induced voltage test at 282% of rated voltage. Electrostatic shielding between all high-voltage-winding layers assures uniform impulse distribution in spite of the numerous tap leads brought outside the transformer.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

1 CM of COPPER INSULATED WITH A.V.C.®

Does the work of 1.6 CM of Copper with type RH

TABLE OF CURRENT CARRYING CAPACITIES

CM	Type AVA	Type RH
250000	296	224
300000	324	251
350000	367	273
400000	395	295
500000	442	334
600000	494	370
700000	526	405

Ambient Temperature 40°C - 104°F

This Means You Save 4 Ways:

USE SMALLER CABLE
to carry the same ampere load, or carry a greater load with the same size cable.

SAVE ON CONDUIT
because A.V.C. cable is smaller, or carry more current per conduit.

SAVE ON FITTINGS,
bushings, couplings, terminators, connectors, etc., because you use smaller cable.

SAVE ON LABOR
because A.V.C. is lighter and smaller. You can pull it through conduit easier, faster and cheaper.

Write for booklet "Cut Current Carrying Costs."

It's the

A.V.C.

"Sandwich" That Makes The Difference

OUTER FELTED ASBESTOS WALL

VARNISHED CAMBRIC

INNER FELTED ASBESTOS WALL

This *"sandwich"* protects the varnished cambric. It enables A.V.C. to carry more current than cables with conventional insulations.

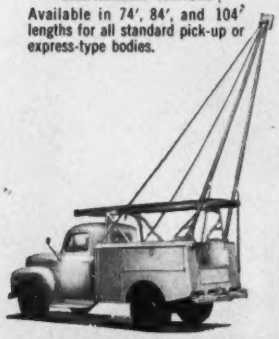
ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONN.
the originators of A.V.C.®
New York • Cleveland • Detroit • Chicago • Pittsburgh • St. Louis
New Orleans • Los Angeles • Seattle • Oakland, California

...Your best buy

LINE CONSTRUCTION BODY (600C)
This workhorse of the utility industry can be furnished in lengths from 9' to 14' for any type of utility construction work.

REVOLVING AERIAL LADDER
Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.

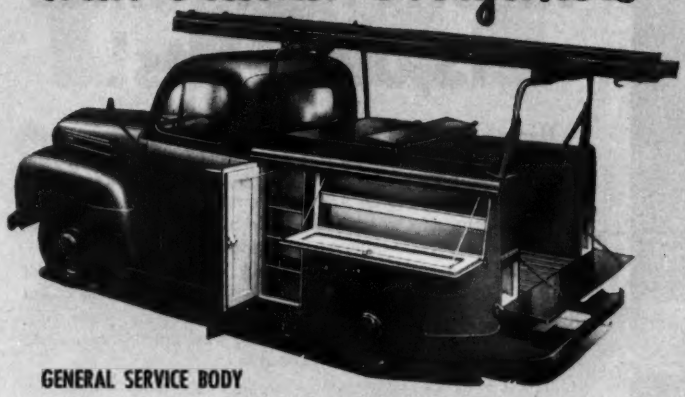
COMPARTMENT SECTIONS
Available in 74', 84', and 104' lengths for all standard pick-up or express-type bodies.



LIGHT DUTY MAINTENANCE BODY (350)
This compact unit is widely used for service and light duty construction. Fold-over derrick can handle 40' poles.

There are many styles of *Powers-American* Bodies not shown here. Write for descriptive catalog today.

"The Accepted Standard with Utilities Everywhere"



GENERAL SERVICE BODY
Available in a wide range of body styles to fit operating requirements in all phases of the utility industry. Models can be furnished for ½, ¾, 1, and 1½ ton chassis. Compartments can be equipped with shelves, bins, and accessories to suit individual needs.

The 1 Source
for all types of utility bodies and equipment!

There's no need to look further than *Powers-American* to solve all your utility body and equipment needs. Whether the job calls for a small service body for repair work, a line body for large construction jobs, or special equipment such as towers or ladders, *Powers-American* is *your* answer.

Leadership in construction, maintenance and service work in all phases of the public utility industry guarantees long life and trouble-free service. Write today for more information.

POWERS *American* DIVISION

AGB

PUBLIC UTILITY BODIES AND EQUIPMENT

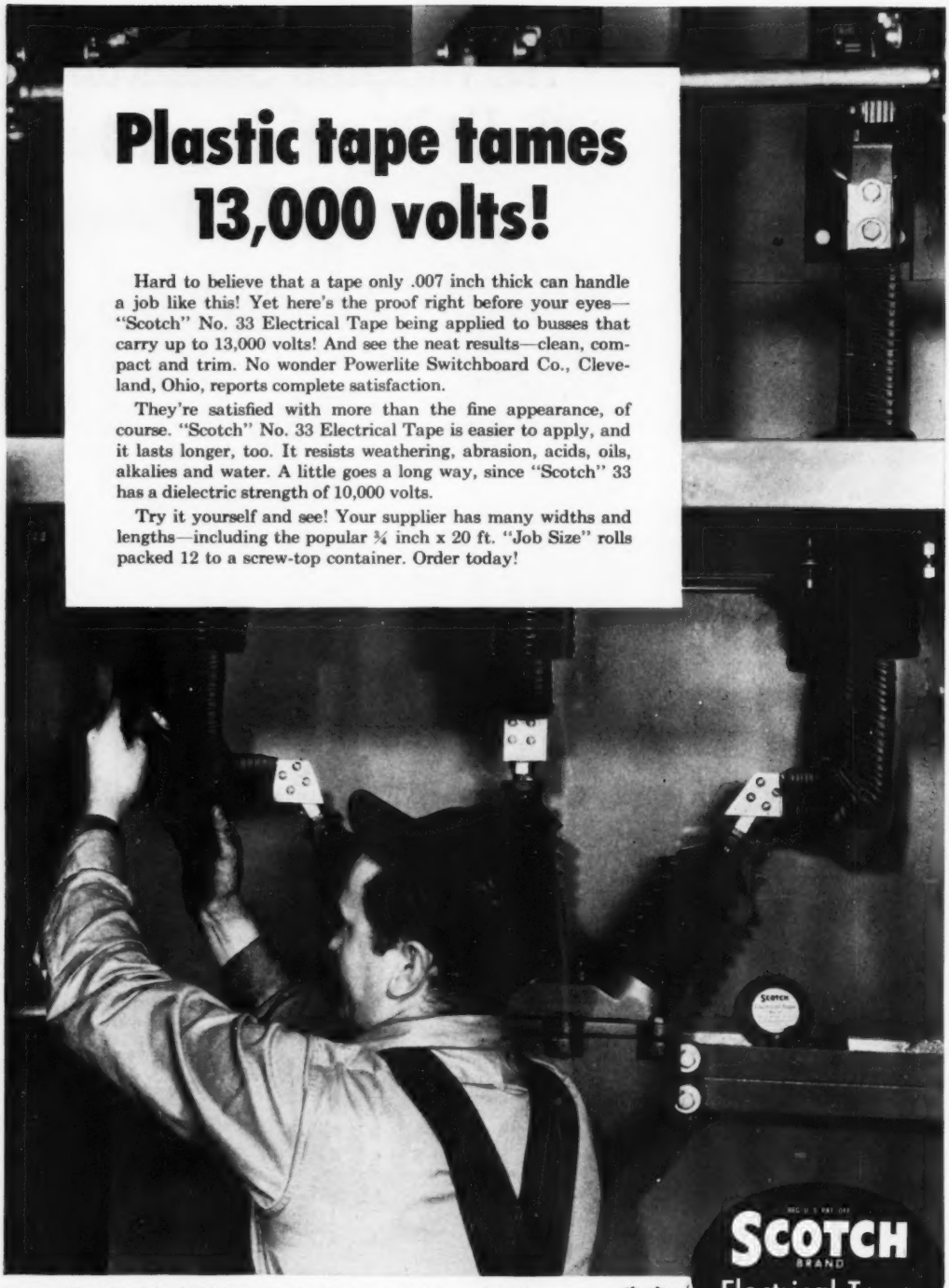
McCABE-POWERS AUTO BODY COMPANY
432 Fifth Street, Oakland 7, California

Plastic tape tames 13,000 volts!

Hard to believe that a tape only .007 inch thick can handle a job like this! Yet here's the proof right before your eyes—"Scotch" No. 33 Electrical Tape being applied to busses that carry up to 13,000 volts! And see the neat results—clean, compact and trim. No wonder Powerlite Switchboard Co., Cleveland, Ohio, reports complete satisfaction.

They're satisfied with more than the fine appearance, of course. "Scotch" No. 33 Electrical Tape is easier to apply, and it lasts longer, too. It resists weathering, abrasion, acids, oils, alkalies and water. A little goes a long way, since "Scotch" 33 has a dielectric strength of 10,000 volts.

Try it yourself and see! Your supplier has many widths and lengths—including the popular ¾ inch x 20 ft. "Job Size" rolls packed 12 to a screw-top container. Order today!



SCOTCH BRAND
Electrical Tape
No. 33

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

3M COMPANY

Meet **MAC GORDAN** of Baltimore. He's our Purchasing Agent. His job is to locate suppliers who can produce materials and parts suitable for use in making Locke Insulators. He also sees to it that these suppliers come through with products which meet Locke's manufacturing standards. "You'd be surprised," remarked Mac, "how tough it is for us to find suppliers who produce materials and parts which come up to our 'specs'. It looks to me as if Locke has the highest, most rigid quality standards in the industry." We asked Mac to prove his point. He came up with three good examples. Here's the story, as he told it to us.

Here's why Mac Gordan pays premium prices for parts and materials used in making

LOCKE

Suspension Insulators

"Suppliers," says Mac, "simply can't meet our specifications with ordinary parts and materials."

"For example, take the case of our No. 1840 High Voltage Suspension, shown on this page. Our specification calls for forged steel ball bolts. These ball bolts must have ductility enough to neck-down before they break in a destructive pull test. They must also be capable of taking a 30° bend over a ¼" radius in the neck area without breaking. This guarantees uniformly good tensile strength in the finished insulator. Suppliers had great difficulty meeting this unusual 'spec' with their generally accepted bolts. To give us the extra quality we demand, suppliers therefore charge us a premium price amounting to thousands of dollars extra a year. We absorb these extra costs, because we feel that our customers deserve this added assurance of trouble-free service."

On the next page Mac cites two more examples of Locke's use of premium parts in making insulators which give you premium performance ----

"The premium parts used in making our Suspensions are the best protection we can offer our customers," says Mac Gordan. "They want trouble-free service...we try to give it to them."

"A case in point," says Mac, "is this 6 inch dead-end. We had an opportunity to buy caps for this insulator for much less than we'd been paying. In checking, we found tiny cracks developing in the castings of these cheaper caps. We were told these shrink cracks were inevitable and wouldn't weaken the casting. But rather than lower our standards, and take a chance on quality, we decided to pass up this cheaper cap. We now use a premium-priced cap which costs us thousands of dollars a year extra. We absorb this cost because it gives customers the extra quality they expect in Locke 6-inch discs."

"Take this 25,000 pound Suspension," Mac continues. "Here's another case of 'what's good enough for others, often isn't good enough for us'. We wanted a new cap for this insulator. One supplier quoted a price 25 cents less than the usual price. Again, this cheaper cap was apparently well-accepted. In checking, we found lumps inside the casting, which though invisible, would tend to weaken the insulator assembly. What's more, the castings would not pass our gage for cotter key hole, roundness of lip diameter, and inside height and profile. The cap was obviously inferior. We're now paying 25 cents per insulator more than the average for this cap. This is just another good example of how we protect our customers at all times by using premium parts and materials."

YOU ARE EQUALLY SURE of getting a masterpiece of design when you specify other products in the complete line of Locke insulators and suspension hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus. Locke Department, General Electric Company, Baltimore, Md.

LOCKE

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS

SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

GUY INSULATORS

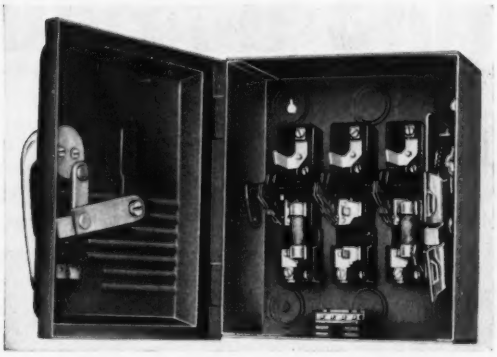
LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

SUSPENSION HARDWARE

ENTRANCE BUSHINGS

PRODUCT NEWS



Industrial Switches

(1) Federal Electric Products Co., 50 Paris St., Newark 5, N. J.

A new ACI line with voidable interlock is claimed to offer type A switches at type C prices and to halve the number required for a complete stock up to 1,200 amp.

A solid neutral block has been added to each switch up to 200 amp to meet requirements that formerly demanded a stock of four or more switches, the manufacturer states. Up to 200 amp, the new industrial switches have design features of the manufacturer's A front-operated safety switch — visible blade construction; patented fuse clip; operating cross bar beneath the blades; 3-position, front-operated handle; handle with accommodations for three padlocks; mufflers or Rolarc Arc snuffers; unit pole block construction. Front operation permits close ganging. The handle clearly indicates on or off position.

A similar simplification has been made on the manufacturer's type D safety switch line.

Metal Strapping

(2) A. J. Gerrard & Co., 1950 Hawthorne Ave., Melrose Park, Ill.

Called Finger Strap, a new metal strapping is designed for applying all types of insulation to pipes, ducts, tanks and flat walls. It is ¾ in. wide and comes in thicknesses from .015 to .035. Tapered fingers ¼ in. wide are spaced at intervals to secure the insulation.

The strapping is applied around tanks, ducts or pipes with a Steelbinder strapping tool and can be nailed or screwed to a wall or other flat surface. Once fastened, the steel fingers are lifted outward to a 90° angle and the insulation impaled on them. A slit washer is then slipped on the finger tip protruding through the insulation and the tip is bent firmly back against the washer.

Finger Strap comes in continuous coils in plain steel, galvanized, stainless 430 or monel. The fingers are from 1⅜ to 4½ in. in length as specified and are spaced at intervals of 5 to 12 in.

Protective Relay

(3) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A slow-speed overcurrent type CO protective relay with inverse or very inverse time characteristics is used principally for protection of transmission and distribution lines. These relays are available in one of three ranges: 0.5 to 2.5 amp, 2 to 6 amp or 4 to 12 amp. Accuracy, flexibility and reliability are claimed for these units.

Adjustable magnetic plugs in the newly designed E element electromagnet give accurate timing, according to the manufacturer; accurate pick-up at tap value of current for all disc positions is provided by two independent adjustments; adjustment of the damping torque of the permanent magnet can be made by means of a keeper screw without moving the magnet.

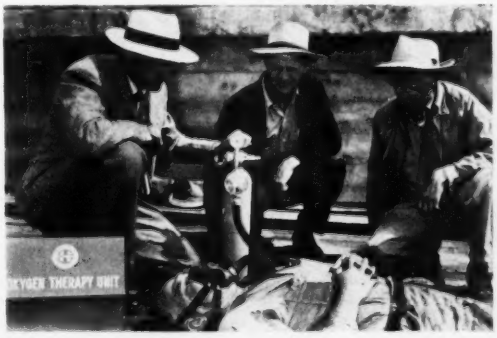
The relay can be changed in the field from one time characteristic to another and it is mechanically and electrically interchangeable with the old type CO relay.

It is available in either standard projection or Flexitest case.

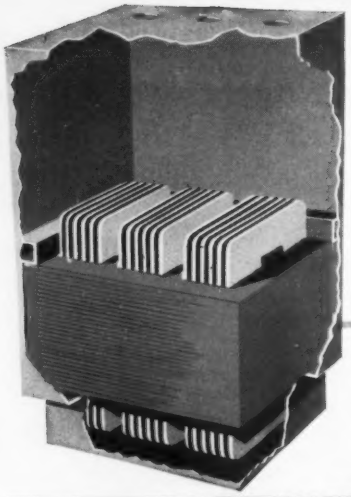
Ceramic Capacitors

(4) Allen-Bradley Co., Milwaukee, Wis.

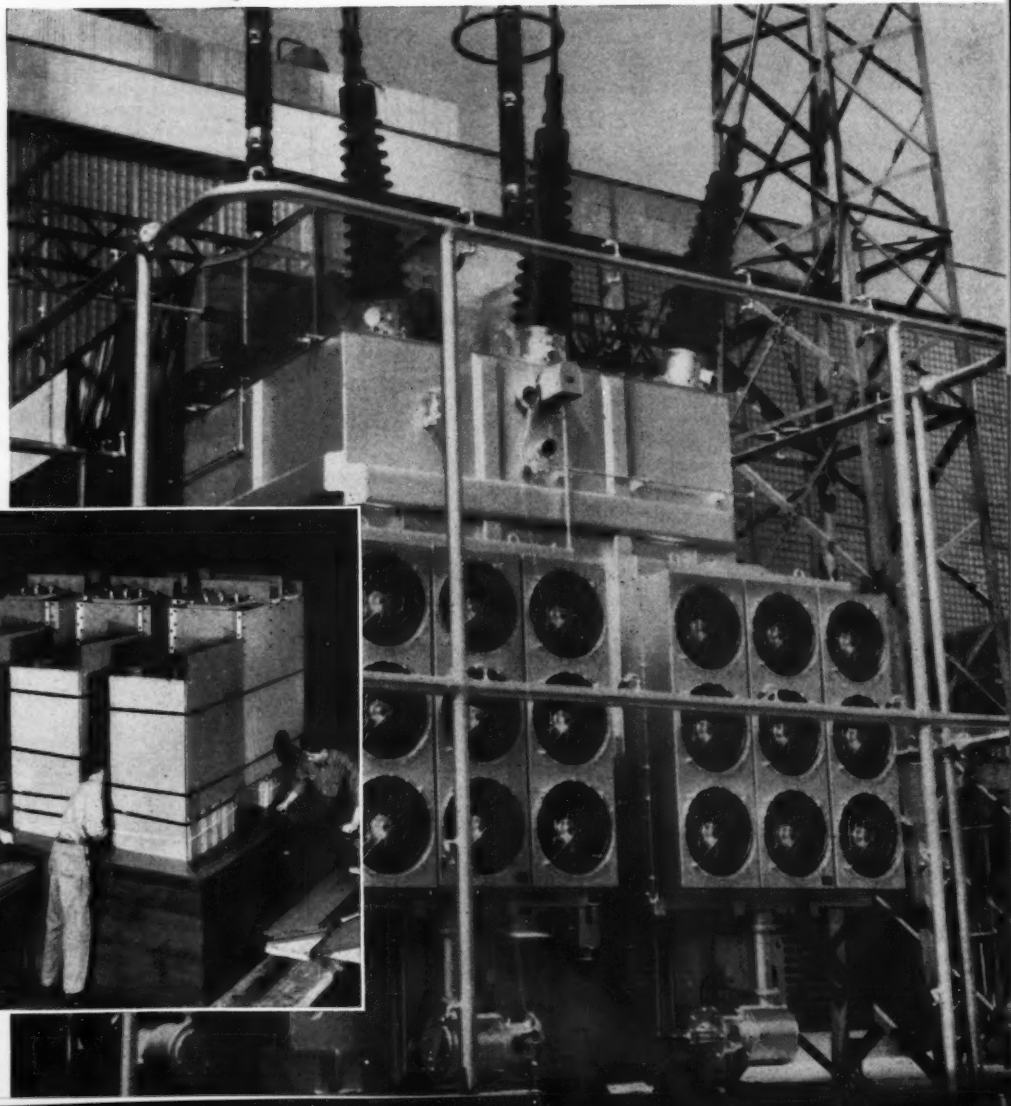
A line of disc-type ceramic capacitors for the radio and television industry ranges from 0.001 to 0.01 microfarads. Basic element is a ceramic disc of high K dielectric, molded and sintered in the manufacturer's plant. A deposit of silver paste is applied to each face of the disc and heat treated to reduce the paste to metallic silver. Leads are soldered to the silver surfaces and the entire capacitor is insulated with phenolic resin. The unit is then wax impregnated to resist moisture.



(5) An oxygen therapy unit used in its safety program by Tacoma City Light is demonstrated by department employees, Gordon Tatum, personnel and safety supervisor, Fred Dorfner, Dave Rea and C. W. Davie. A refinement of an oxygen demand regulator developed for high-altitude flying during the war, it is made by Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.



This design



knocks big figures off installation cost

When you figure *installed cost,* a Westinghouse Form-Fit Power Transformer shows substantial capital savings.

It's easier for your crews to handle; get on the line faster. Over-all dimensions are considerably smaller than comparable ratings in other designs. Weight is correspondingly lower, too. This leads to worth-while savings in both foundation and overhead structures.

The Form-Fit case clamps the core, and the core, in turn, surrounds, supports and protects the coils. This compact and sturdy construction permits a transformer to be transported to your site on its side when shipping clearances would otherwise require disassembly. Or it may be tilted at any angle to facilitate installation. This rugged construction means less danger of damage through accidental mishandling; gives added assurance that the quality built into the transformer will reach your site intact.

When you need greater transformer capacity installed on schedule at lowest capital cost, check Westinghouse Form-Fit Power Transformers. Your Westinghouse representative will be glad to give you further information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-70626

147,500 kva
3-phase 60 cycle FOA
161 kv to 17 kv

YOU CAN BE SURE...IF IT'S
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POWER TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

10-Kv Hard Boiled Safety Hat

(6) E. D. Bullard Co., 275 8th St., San Francisco, Calif.

A new high dielectric hard boiled safety hat for linemen and other electrical workers, as illustrated, has a certified dielectric strength of 10,000 v; comes in a choice of colors; has adjustable headbands and hammocks for comfortable fit to any head size; is cool and weighs only 14 oz. The protection afforded by hard boiled hats is long lived. Resin-impregnated glass-fiber construction is nonaging. Extremes of heat and cold encountered under working conditions do not make them soft or brittle, the manufacturer states.

Insulating Film

(7) Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

Polytetrafluoroethylene electrical insulating film in a form that can be fused into a coherent mass after application has been added to the Scotch brand line and is designated as PTF, type B. It is made from unfused Teflon resin in a flexible and stretchable form claimed to make it easier to use and to increase efficiency. It is suggested for Class H insulation on conductors, coils, condensors, transformers and other installations operating at high temperatures, frequencies and voltages.

Dielectric strength after fusing is more than 1,000 v per mil and moisture vapor transmission is less than 1/10 gram per 100 sq in. over a 24-hour period. In manufacture of printed circuits its high mechanical shock resistance enables it to be used where ceramic-base materials cannot be used, according to the manufacturer.

It is claimed to resist degrading effect of ozone caused by arcing brushes in completely enclosed motors and generators; to have high conformability to "pull down" when fused. It can be applied in place and is said to adhere under slight pressure without use of an adhesive. The new film is opaque but after being fused turns cloudy-transparent. It is available in colors.

According to the manufacturer, small wires insulated with the film can be fused at temperatures of as low as 650 F in 15-20 minutes or in 15 seconds at temperatures of 1,000 F, depending on insulation thickness, wire size and method of heating.

The film comes in 36-yard rolls in widths from ¼ in. to 6 in. and in thicknesses of 3, 5, 10 and 15 mils.

Circuit Breaker

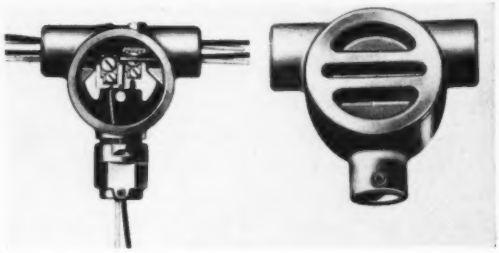
(8) Trumbull Electric Department of General Electric Co., Plainville, Conn.

The K-173 hi-shock plug-in circuit breaker with a subbase for mounting, designed primarily for protection of 3-wire lighting systems, can be used for 2-wire systems by connecting the circuit to the two protected poles. According to the manufacturer, it is suitable also for overload and short-circuit protection of load circuits supplying power to single-unit devices, such as radar, ordnance and electronic equipment.

Rated at 125 v a-c or d-c, with trip ratings from 10 to 50 amp, this breaker can be used on any frequency system between 60 and 400 cycles and has an interrupting rating of 5,000 amp.

Plug-in features and the mounting base are said to permit quick removal and it is claimed that a damaged breaker can be replaced without disconnecting a line or load wire.

In addition to Navy circuit breakers with trip ratings, the manufacturer offers a nonautomatic type for use as a small, compact hi-shock disconnecting or switching device. It is rated 50 amp but does not give overload protection.



Fixture Hanger

(9) Crouse-Hinds Co., Syracuse 1, N. Y.

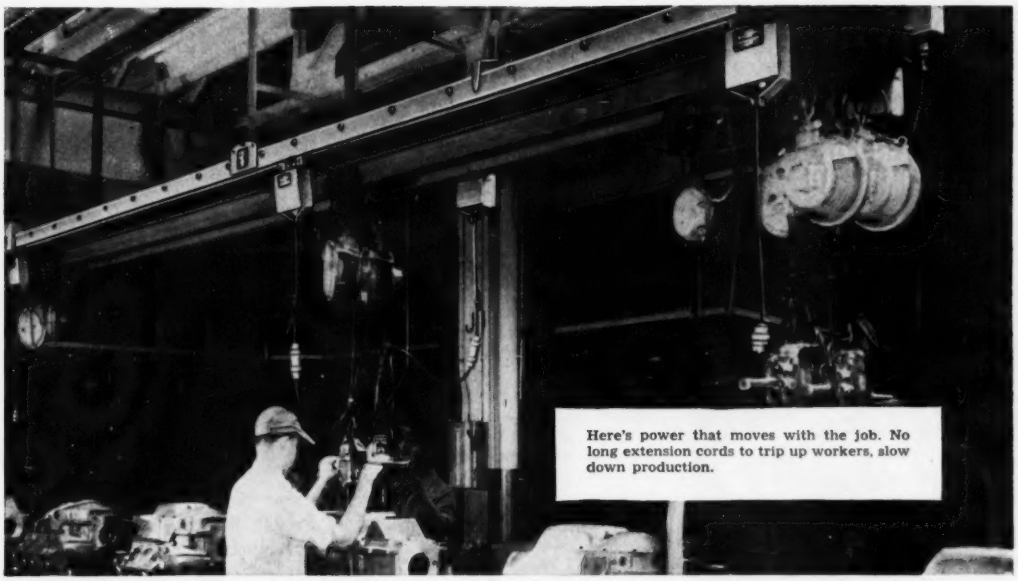
An explosion-proof fixture hanger meeting Underwriters' requirements and the NECode is essentially a T fitting, with the top two through-feed hubs for the lighting circuit and the bottom hub for the fixture stem. Previously it has been necessary to suspend explosion-proof lighting fixtures from small junction boxes with union, nipple or canopy covers.

A threaded cover is provided at the side so that it directly faces the installing electrician. The fixture with stem and connecting wires can be assembled on the bench. The fixture stem may be threaded into the bottom hub of the hanger without the risk of twisting the connecting wires before connection is made to the circuit wires.

A compact connection block is available for connecting the fixture wires to the circuit wires by means of two double terminals, or the wires may be applied in the normal manner.

This type EFHC hanger comes either with plain hub or union hub for the fixture stem. Both types have set screws to prevent the fixture stem from loosening with vibration.

For Additional Information
Fill in the Coupon on Page 54

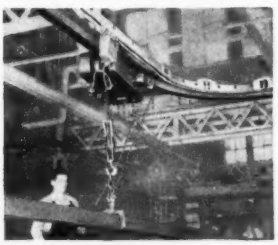


Here's power that moves with the job. No long extension cords to trip up workers, slow down production.

Production rolls when power supply rolls with it!

BullDog Industrial Trol-E-Duct lets power feed go right along with the job. Saves up to ½ hour per man per shift.

Industrial Trol-E-Duct with tap-off outlets in boxes feeds motors on a moving test line. Power where you want it!



Heavy-duty mobile hoist is fed from trolley moving in duct. Trolleys are available for virtually any load requirement.

Where production equipment must move freely, Industrial Trol-E-Duct provides the means. This modern, highly flexible system of electrical distribution not only carries current to the job, but supports heavy tools. Rated at 100 amperes.

Trolleys, riding overhead in continuous duct slot, tap power from enclosed bus bars and relay it to portable power tools, hoists, cranes and other moving "loads." You get power that rolls right along with the job . . . mobility that means extra production. Users report savings up to ½ hour per man per shift.

Entire system is prefabricated, standardized for easy installation. Dismantles and reinstalls swiftly, speeds up plant change-overs. Completely salvable, safe, efficient, guaranteed.

Get the complete story on Bull-Dog Industrial Trol-E-Duct. Call in a BullDog Field Engineer, or write direct for free bulletin.

This slot is the secret of mobile power. Through it, Industrial Trol-E-Duct provides a continuous power outlet.

Cross section of duct and trolley. Steel wheels and spring-button contacts assure smooth-rolling, positive-contact trolleys.

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DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
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Pilot Bit

(10) Petersen Engineering Co., Santa Clara, Calif.

The Pengo Jr. pilot bit for Danuser augers was designed for rapid penetration in hard-to-bore soils. Patterned after the hardpan pilot bit used on heavy-duty augers, this model features a live-action fishtail design that eliminates the centerpoint and resulting tendency to pivot on stones or hard ground. Forward-angled cutting lips on either side of the center line slice a pilot hole ahead of the wedged-shaped main pilot blade, which in turn breaks up the earth ahead of the auger helix.

This bit is cast from abrasion-resistant alloy and is heat treated for maximum service life. It is equipped with standard thread to fit all Danuser augers from 6 in. diameter up.

Rosin Flux

(11) London Chemical Co., 325 W. 32nd St., Chicago 16, Ill.

Lonco activated rosin flux is claimed to be faster acting, noncorrosive and nontoxic. It is for soldering on copper, brass, bronze, nickel or their alloys. According to the manufacturer, it may be used with solders containing as low as 20% tin, or silver solder containing 5% silver and 5% lead, with a high melting point.

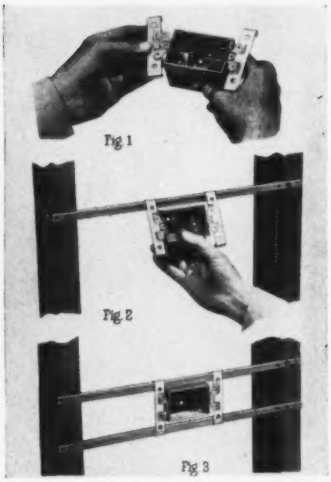
Brazing Alloy

(12) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A copper-phosphorus-silver alloy, with registered name Phos-Silver, is available for brazing copper, brass and bronze. Extreme fluidity and good wetting properties are claimed for this alloy, which is said to penetrate tight-fitting joints instantly to form strong ductile bonds. Uses are in assembly of refrigerating and air conditioning equipment, motors and transformers, etc.

(13) MASONRY DRILL—Thunder-Core carbide-tipped drill bits are for holes ¾ to 5 in. diameter; are claimed to cut through materials such as concrete with bluestone or granite aggregate and solid granite; to make it possible for one man to drill holes in hard masonry with no binding. Made by New England Carbide Tool Co., Cambridge 39, Mass.

(14) RELAYS— Delay relays made by Amperite Co. Inc., 561 Broadway, New York 12, N. Y., are available in miniature T6½ bulb-base 9-pin tubes. They can be supplied for all standard heater voltages, according to the manufacturer, and 2- to 90-second delays are available.



Switch Box Support For Horizontal Mounting

(15) The M. B. Austin Co., Northbrook, Ill.

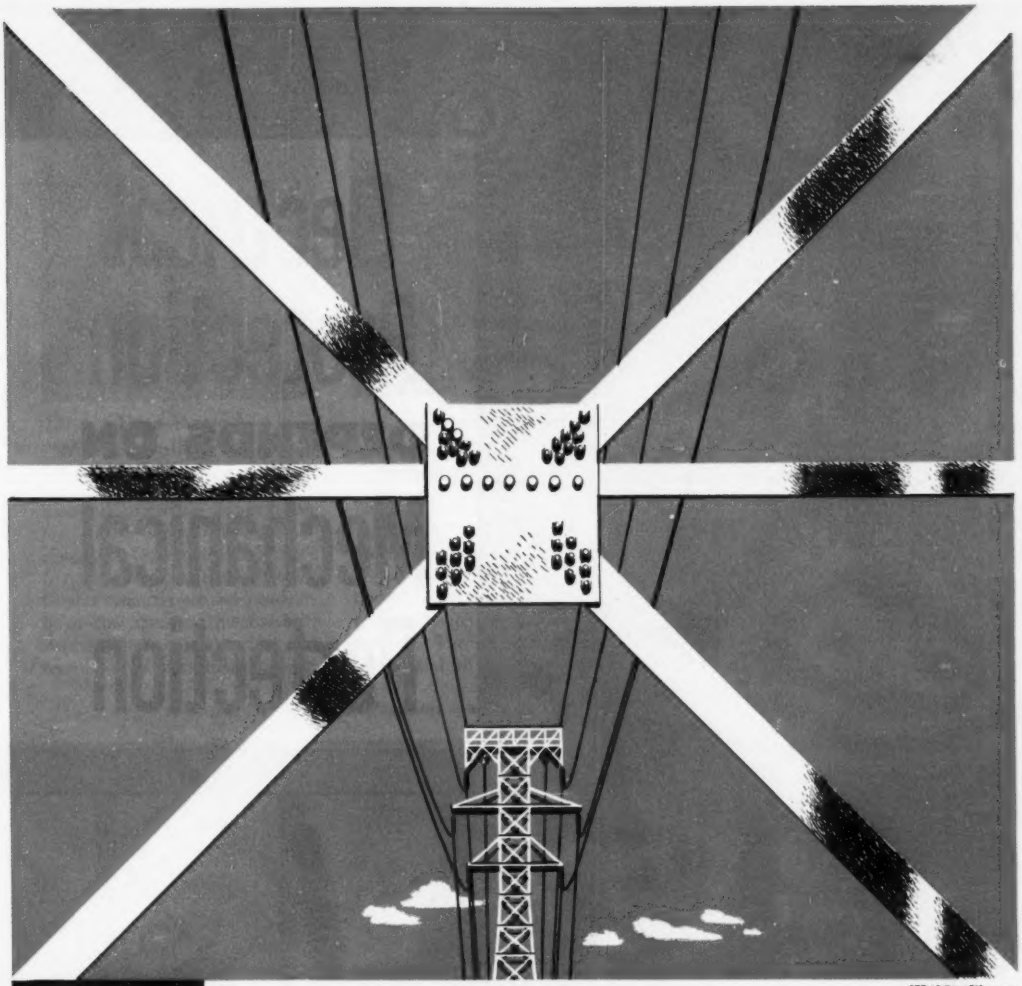
A means of mounting a switch or receptacle box in horizontal position includes the following steps: (1) clips are snapped on plaster ears of box; (2) box is hung from straight bar hanger mounted horizontally on joists; (3) second hanger is fitted to lower ends of clips and nailed in position parallel to first hanger.

According to the manufacturer, this method permits box to be mounted in horizontal position at any distance between joists and at any height between ceiling and floor. Box can be adjusted also in or out for accurate flush mounting.

The kit contains two snap-on mounting clips with embossed nubs that hold to ears firmly and two straight 18-in. formed-type galvanized hangers; also available in 25 in. length.

(16) CONTROLLER — An electronic strip chart recording and indicating program controller provides for automatically conducting the complex time-and-temperature programs required in heat treating operations, etc. The instrument has a motor-driven set point index in addition to temperature measuring, controlling, recording and indicating components and will automatically maintain preset rates of temperature rise, fall, and timed soaking or holding periods. Product of Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne and Windrim Aves., Philadelphia 44, Pa.

For More Data Fill in the Coupon on Page 54



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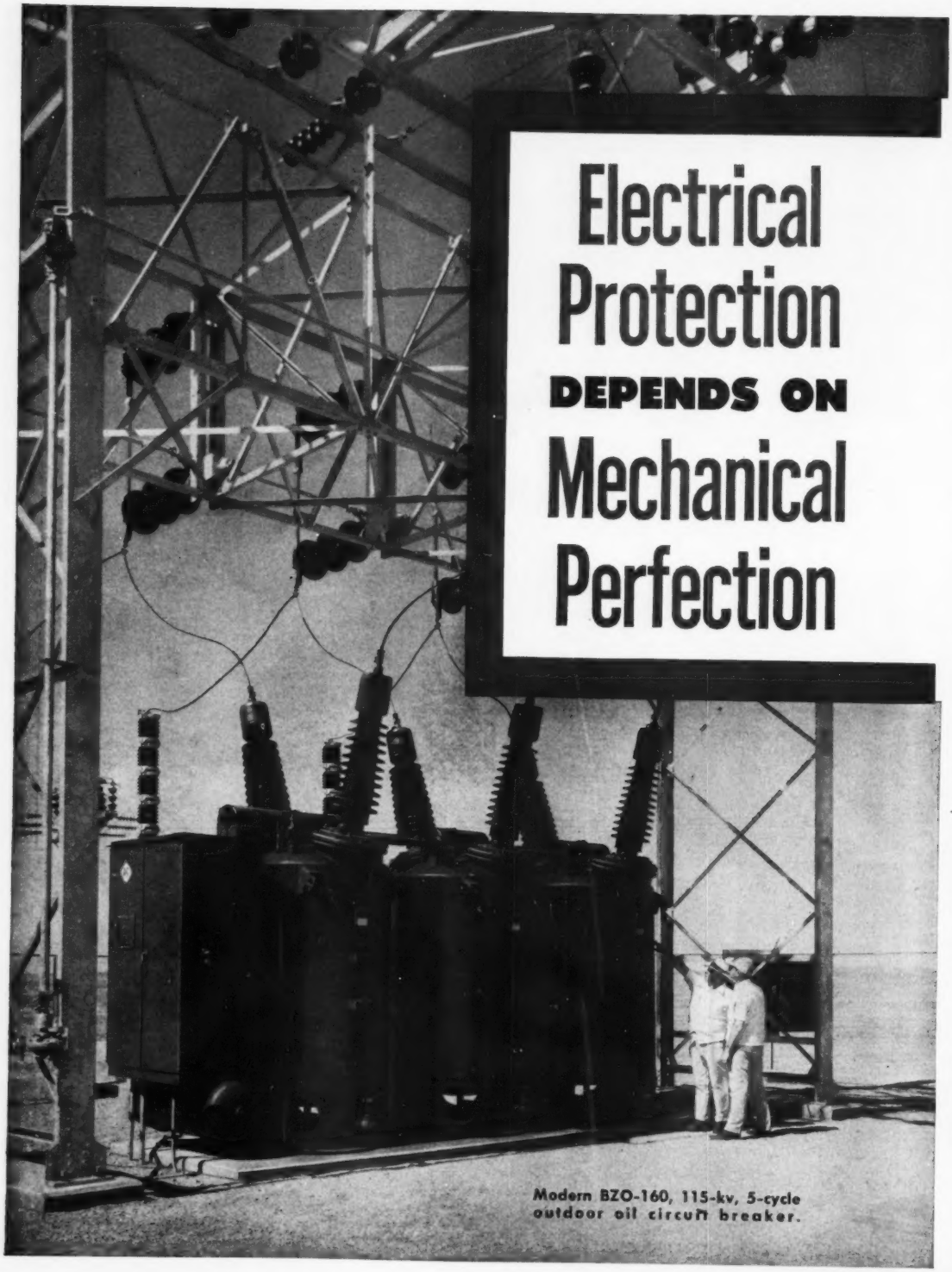
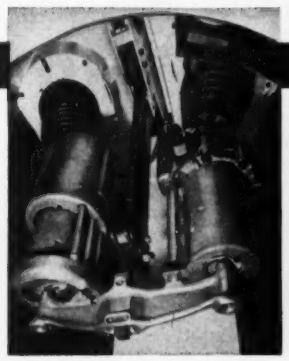


Electrical Protection DEPENDS ON Mechanical Perfection

Modern BZO-160, 115-kv, 5-cycle outdoor oil circuit breaker.

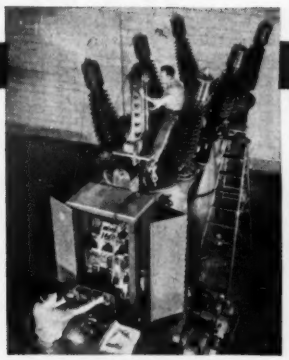
Time-Proved Mechanically Trip-Free Pneumatic Operator

Electrical protection depends on *fast breaker operation under all conditions.* Only mechanically trip-free operation assures this because breaker contacts open independently of the operating mechanism. And such operation provides fast recoupling for immediate reclosing.



Time-Proved *Turbo-Ruptor* and *Turbo-Jet* Interrupting Devices

Electrical protection depends on *fast circuit interruption.* A-C low arc energy devices employ directed oil turbulence for swift arc extinction; self-cleaning, low resistance contacts assure low operating temperature. The result is minimum contact and oil deterioration.



Time-Proved Electrical and Mechanical Pre-Shipment Testing

Electrical protection depends on *unfailing, coordinated operation.* A-C breakers are designed to provide that operation and are thoroughly tested to assure it. Before shipment, electrical and mechanical operation is verified by rigid checks and special test equipment.

Turbo-Ruptor and *Turbo-Jet* are Allis-Chalmers trademarks.

Type BZO OIL CIRCUIT BREAKERS

Details Contribute to Dependability

Double-hinged, gasketed mechanism housing doors . . . white enameled tank interiors . . . large, hinged tank manhole covers — these and many other details provide easy accessibility for inspection and contribute to the over-all reliability of Allis-Chalmers circuit breakers.

RATINGS

From 69 to 230 kv . . . 1,500,000 to 10,000,000-kva interrupting capacity . . . 5 and 3-cycle interrupting times . . . repetitive reclosing service to meet the industry's fastest requirements.

For more information about these Type BZO oil circuit breakers, ask your nearby A-C representative for Bulletin 71B6022, or write to Allis-Chalmers, Milwaukee 1, Wis.

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It's new!

PIPE MOUNTING HOUSE BRACKETS

NO MORE FUSSING OR FUMING
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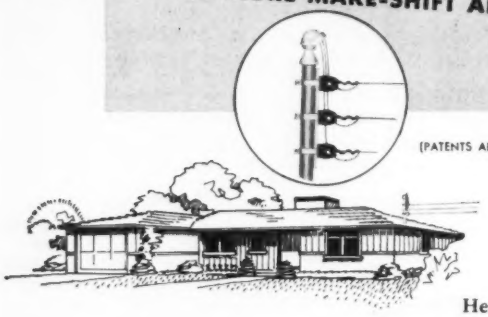
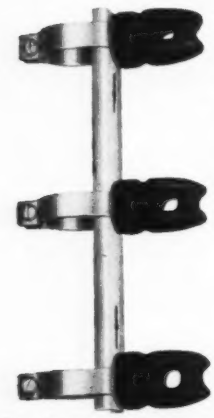
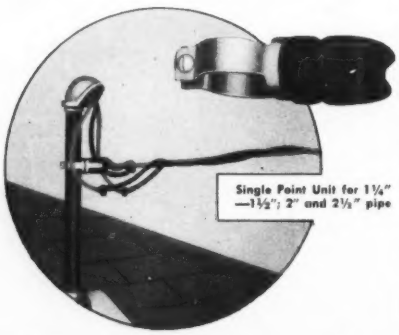


Here's just what you've wanted all along. Porcelain Products offers you the *first* easily attached, low priced Pipe Mounting House Bracket for use wherever you fasten electrical conductors to pipe. They're perfect for residential, industrial or rural wiring jobs... ideal for ranch type housing with wide eaves. Save time..money.. avoid costly delays. Write for prices, literature.



Three Point Unit 4½" or 6" wire spacing, for 2" and 2½" pipe



Single Point Unit for 1¼" —1½"; 2" and 2½" pipe

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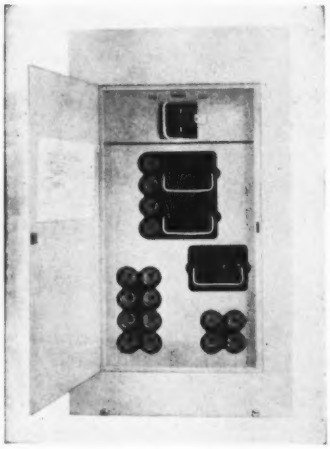

Combination Service Equipment

(17) Murray Mfg. Corp., 1250 Atlantic Ave., Brooklyn 16, N. Y.

A 100-amp combination unit is designed to give both service entrance and branch distribution. Five combinations are available. The basic unit contains a 100-amp main, fully magnetic circuit breaker, 60-amp range fusible pull out, 30-amp water heater fusible pull out and 12 plug fuse branch circuits.

The four other units have in addition: (1) four extra plug fuse branch circuits; (2) eight extra plug fuse branch circuits; (3) a 30-amp dryer fusible pull out; (4) a dryer pull out and four extra branch circuits (illustrated).

Factory busing makes units easy to wire, according to the manufacturer. Hook-on cover uses two screws. The unit is 12⅞ in. wide and is designed to fit between building studs. Fusible pull-out construction gives positive electrical contact. One-piece fuse clip and blade prevents overheating.

Electronic Timer

(18) Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.

Type 30HL1 is for intervals from 1/20 second to 4 minutes; gives four basic types of timing: interval; delayed action; automatic repeat; programming; and variations of these types. Timing combinations may be utilized by changing external connections to the terminal board.

(19)— STARTERS—New Bull Dog No-Blink fluorescent starters claimed to assure positive, quick starting and a life of at least 36,000 operations have been introduced by Marvel Fluorescent Mfg. Co. of Hoboken, N. J.

Here's an Easier Way
to install Gang-Operated Switches

CHANCE WN-VN SWITCHES

permit quick installation of interphase shaft without "threading"

Chance Tilting Insulator Switches for outdoor gang operation give you always reliable switching under all conditions. The reason? . . . Such operating advantages as the exclusive Compensator Control Mechanism that means positive performance under all conditions—"Crow Bar" Leverage that breaks heavy ice with ease—Compensation for structural warpage—and *New Ease of Installation.*

WN-VN Switches *are* easier to install than any other gang-operated switches. The arrows in the illustration above point out the features that make installation simple.

1. The flanged base has double slots and slotted holes for ready installation on all standard construction. (Front mounting brackets are supplied for steel structures.)

2. The clamp on each switch swings open to permit the interphase shaft to be laid in position *after* the switch units are mounted.

3. The interphase shaft bar is then inserted in all three phases at once—without the necessity of "threading" through small fittings.

4. Easy adjustment (only necessary under unusual conditions*) is accomplished by pulling the stainless steel pin which connects the compensator control rod, loosening the lock nut (4), and turning to adjust.

All control connections on Chance WN-VN Switches are made with clamp type fittings for maximum flexibility.

Rugged "torture rack" tests prove that the performance of these switches is not affected by any conceivable warpage of cross-arms—Ice tests prove their exceptional ability to open and close without difficulty when coated with over ¾" of hard, clear ice. Chance WN-VN Switches can be isolated, while energized, with Hot Line Tools for live line maintenance.

For reliable switching *plus* time saving installation advantages, specify Chance Type WN or VN Switches.

Send for complete catalog information or test data or consult Section 11B of your Chance catalog.

**All WN or VN switches are factory adjusted for proper contact and gap clearance before shipment.*

You know it's RIGHT when you specify CHANCE

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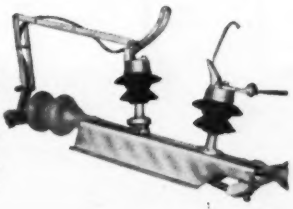
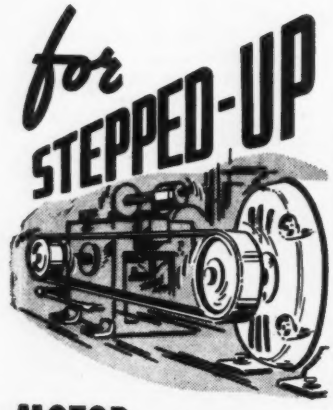


Chance Type VN 200 Amp. Switch. A two-insulator tilting type switch built for service and economy.



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What makes the performance of motors and generators better?

The answer is very simple—merely equip them with the proper OHIO brushes and watch them "Go to work!" In order to pick the proper brush for the proper application, we have compiled complete catalogs on the following various subjects:—Industrial, General Purpose, Mining, Welding, Appliances.

Here at "OHIO" we welcome your inquiries and specifications for unusual and specially designed carbon specialties.

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Welder

(20) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A light-weight engine-driven welder, type EW-20, is equipped with complete engine accessories and auxiliary apparatus to supply 110-v 60-cycle single-phase power from a conventional plug-in outlet.

Nominal rating is 200 amp, 40 v, 60% duty cycle with current range from 40 to 250 amp in accordance with NEMA standards. During off-welding periods auxiliary power of 3 kw at 100% power factor or 2 kva at 80% power factor is available for lights and power tools. During welding periods about 300 w auxiliary power is available for lights.

Coupled to a Ford 120 4-cycle 4-cylinder water-cooled industrial power unit, the self-excited, compound-wound generator functions both as a d-c generator and a single-phase alternator for auxiliary power. Welding current is controlled in four ranges by a tap switch and shunt field rheostat. The a-c power circuit includes conventional outlets, a voltmeter and a breaker with overload protection.

(21) ACCOUNTING MACHINE—Series 400 Sensimatic accounting machine with special automatic features to simplify billing and increase operator production has been announced by the Burroughs Adding Machine Co., Detroit 32, Mich.

(22) HUMIDITY CONTROL—Supersensitive, instant response with plug-in element, wide range and simple adjustments are claimed for a new electronic humidity control developed by Barber-Colman Co., Rockford, Ill.

(23) EXTENSION CORD — Six outlets over a distance of 12 ft are provided by a new extension cord. From a single molded male plug, two 6-ft rubber-covered extensions may be led in any direction. Each cord is terminated in a 3-way receptacle. Product of Davis Mfg. Co., Plano, Ill.

(24) BLUE PHOTOFLASH — Designed for use with daylight-type color positive and color negative film, No. 11B photoflash blue lamp has been developed by General Electric Lamp Division, Nela Park, Cleveland 12, Ohio. It is a medium-peak lamp having performance and other characteristics of the No. 11 photoflash lamp.

(25) REMOTE CONTROL—A cord set produced by Gilbert Mfg. Co., 24-20 46th St., Long Island City 3, N. Y., gives remote control of radio, TV or appliances. It is made of Bakelite phenolic plastic, comes in 9-, 15- or 21-ft lengths. Component parts are UL approved.

(26) WEATHER MAP — A monthly weather map that predicts conditions 30 days in advance by days, cities and areas in the United States is offered by Blewett Weather Service, 919 E. California St., Pasadena 5, Calif.

Truck Bodies

(27) McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.; Western office, 428 Latham Square Bldg., Oakland 12, Calif.

Two service and maintenance bodies, Series 44 and 44-L, have been added to the manufacturer's public utility line. Body compartments have shelves, trays, material hooks and parts bins. Removable shelves in each vertical compartment are padded and furnished with elastic hold-down bands. An overhead rack with adjustable brackets is standard equipment. Doors are of weather-tight construction, fitted with flush-mounted, slam-action handles and cylinder locks, keyed alike.

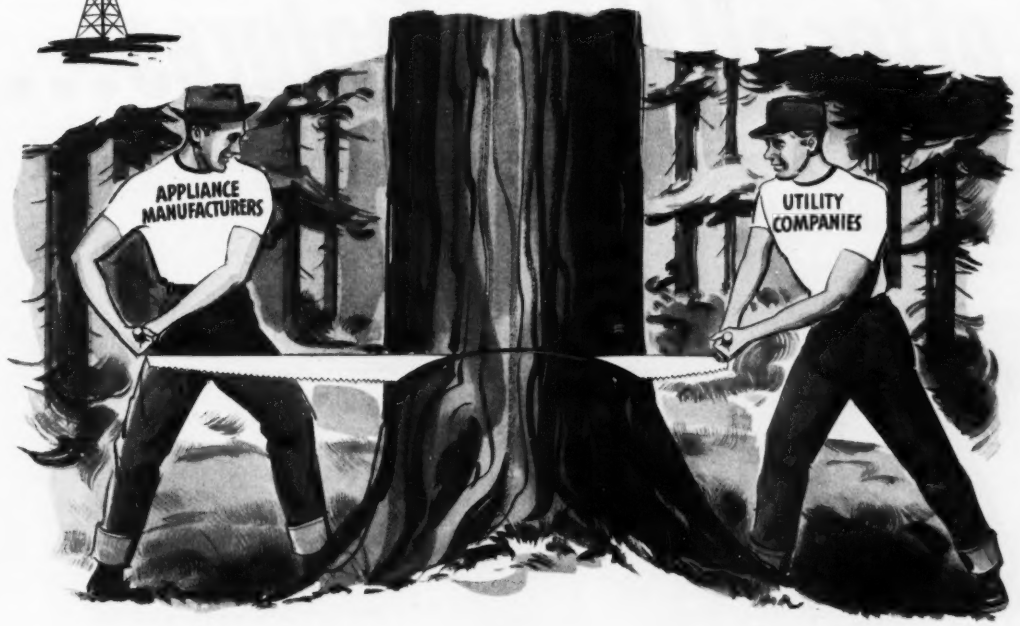
Series 44 bodies, without superstructure, are available in 75, 90 and 104 in. lengths for installation on chassis having C. A. dimensions of approximately 40, 48 and 60 in. respectively. The Series 44-L, with superstructure, comes in 90 and 104 in. lengths for 48- and 60-in. C. A. chassis.

Optional equipment includes telescopic roof, hinged ladder rack to allow its use from rear of truck, side-mounted ladder rack, pintle hook, rear bumper step, pole-setting spool and other accessories to meet individual requirements.

Descriptive bulletins 113 and 114 are available.

(28) VOLTAGE BOOSTER—An automatic single-step voltage booster has been designed for such motor-operated appliances as refrigerators, air conditioners, pumps, milking machines and separators. If the line voltage drops to about 105 v or below, the booster is automatically connected into the circuit; when the voltage rises to 110 v or more, the booster is disconnected automatically. The manufacturer, Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill., gives details in bulletin 39-0-SCA-37.

TEAMWORK Is Needed For Continued Progress!



The Solution for Increased Residential Revenue!

Increased residential revenue will come from the new "growth" appliances such as Dishwashers—Disposalls®—Freezers—Automatic Dryers—Ironers—Automatic Washers, as well as from Electric Ranges and Water Heaters. Teamwork between the utility companies and appliance manufacturers in the promotion of these products can more quickly bring them to the "demand" stage.

Hotpoint, with a tradition of close cooperation and understanding of utility problems, has taken the initiative in promoting **all-electric living** across the nation. Hundreds of thousands of America's homes are boasting all-electric kitchens and home laundries as a result of Hotpoint's pioneering and never-ending promotion of **all** the ingredients of the all-electric home.

And now, to aid in creating a better balanced and more profitable domestic electrical load, we have available for you new studies on "Balanced Revenue Through Selective Selling" and "Consumer Survey Plans for Retail Salesmen." You can get full information on these studies by writing the Utility Division, Hotpoint Co., 5600 West Taylor Street, Chicago 44, Illinois.

Hotpoint Co.

(A Division of General Electric Company)

5600 West Taylor Street, Chicago 44, Illinois

NOW...Wagner Form W offer all these features...

When you choose Wagner Transformers—you get the benefit of improved design . . . better performance . . . longer life. Then, too, Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

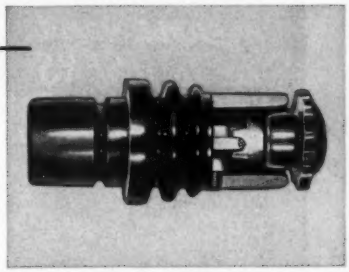
BRANCHES IN 32 PRINCIPAL CITIES

T52-13

Distribution Transformers

1

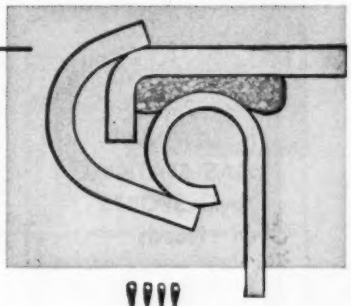
NEW HIGH VOLTAGE BUSHING



Wagner—pioneer in the use of tank wall mounted bushings—has developed a new high voltage bushing that means *faster, easier, safer* permanent transformer connections. *FASTER*—because the conductor is simply pushed in to the connector and tightened with a few turns of the knob . . . *EASIER*—no tools are needed . . . *SAFER*—the knurled knob is insulated to protect the lineman from accidental shock when tightening the terminal.

2

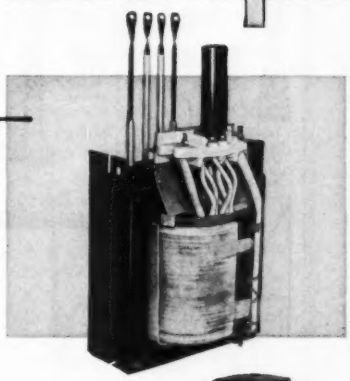
SHUR-SEAL COVER



Here's *true* sealed-tank construction! Covers are sealed to the tank with the Wagner SHUR-SEAL Clamping Ring. "Breathing" is completely prevented—no loss of oil can occur during shipment or handling. The SHUR-SEAL Ring maintains equal pressure all around the cover—yet permits easy accessibility by loosening a single corrosion-resistant bolt.

3

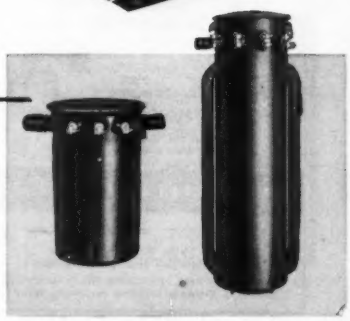
FORM W CONSTRUCTION



Wagner Form W Construction, with preformed cores of cold rolled, oriented grain steel, permits a liberal design in small size, light weight transformers that give excellent electrical performance. Core and copper losses are low . . . voltage regulation is good . . . exciting current is extremely low . . . and short time overload capacity is high. Form W Transformers pay dividends in longer service life.

4

INHIBITED OIL

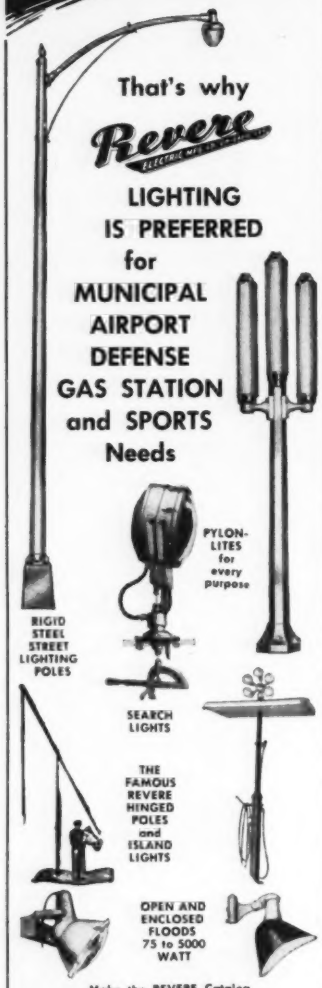


Wagner pole-type distribution transformers are filled with inhibited oil, thus reducing oxidation to a minimum and retarding the formation of acids and sludge which ultimately cause its deterioration. This inhibited oil, in combination with the sealed tank construction provided by the Wagner SHUR-SEAL cover clamp adds years to the servicefree life of Wagner distribution transformers.

Wholesalers know what "COMPLETE LINE" means - and so do USERS

That's why Revere ELECTRIC MFG. CO.

LIGHTING IS PREFERRED for MUNICIPAL AIRPORT DEFENSE GAS STATION and SPORTS Needs


PYLON-LITES for every purpose
RIGID STEEL STREET LIGHTING POLES
SEARCH LIGHTS
THE FAMOUS REVERE HINGED POLES and ISLAND LIGHTS
OPEN AND ENCLOSED FLOODS 75 to 5000 WATT

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Stocked by L. M. BAXTER & CO.
San Francisco — Seattle — Portland
Los Angeles Rep.: BRACKEN SALES AGENCY
Indoor & Outdoor Lighting for Every Need

BULLETINS ETC.

(29) MOTORS—Construction features, ratings and dimensions of its open drip-proof (type AP) and splash-proof (type APWW) squirrel-cage induction motors from ½ to 100 hp are covered in bulletin 51B6210D from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee 1, Wis. All ratings are available in NEMA design B and most in design C.

(30) DEAD-ENDS—Preformed Line Products Co., 5349 St. Clair Ave., Cleveland 3, Ohio, has issued bulletin 35-200 on its preformed dead-ends for conductors, ground strand, guy wires and service drops.

(31) VARNISHES—Selection and use of electrical insulating varnishes, sealers and compounds are covered in a 20-page catalog offered by Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill. Requests for the bulletin should be addressed to its publications department.

(32) POTHEADS—Anaconda Wire & Cable Co., 25 Broadway, New York 4, N.Y., describes its potheads and terminals in catalog C79-13, which is also section 13 of its general catalog. Design data as well as ordering information and installation instructions are given for all types up to 46 kv. Both outdoor and indoor types and popular designs for transformers and switchgear are included. Requests should be addressed to E. F. Luna, Anaconda sales promotion director.

(33) AIR HEATERS—Folder F-1530 covering portable and built-in electric air heaters has been issued by Edwin L. Wiegand Co., 7540 Thomas Blvd., Pittsburgh 8, Pa. Convection, blower, duct and radiant types are shown with automatic controls.

(34) MICROWAVE EQUIPMENT—A new 8-page booklet tells about type FB-1 microwave equipment made by Westinghouse Electric Corp. Covered is equipment for communication channels for telemetering, supervisory control, voice communication, protective relaying, teletyping, facsimile and local control. This booklet, B-5448, is available from the manufacturer, Box 2099, Pittsburgh 30, Pa.

(35) RELAYS—Data on Amrecon relays are contained in a 12-page booklet prepared by American Relay & Controls Inc., 4939 W. Flournoy St., Chicago, Ill.

(36) DRIVES—An 8-page booklet from the Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland 10, Ohio, describes the V-S drive, a packaged, all-electric, adjustable-speed drive.

(37) CONNECTORS — Types LS laboratory and switchboard and GB battery connectors are covered in recent bulletins from Cannon Electric Co., Box 75, Lincoln Heights Station, Los Angeles 31, Calif.

(38) ARC FURNACE EQUIPMENT — A 20-page booklet discusses application of electrical equipment to both direct and submerged arc furnaces for applications in steel mills, chemical plants, foundries and nonferrous metal refineries. This booklet, B-4695, is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(39) BROODERS—Its expanded line of infra-red heat lamp brooders is described by Steber Mfg. Co., Broadview, Ill., in a recent folder. Single-, 3-, 4- and 6-lamp units are listed.

(40) MOTORS—Design and application of Life-Line motors in ratings up to 700 hp are covered in a 20-page booklet (B-4731) offered by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after October 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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Good Engineering Counts

—ESPECIALLY WITH 3500 HP AT STAKE

THESE 3500-HP, 3582-RPM MOTORS are driving boiler-feed pumps in a midwestern power plant. They were purchased only after a thorough check of Allis-Chalmers two-pole cage motor design details. And their operating reliability has proved that A-C engineering can meet the requirements of the largest boiler-feed pump drives in the power industry. A-3806

GET THE INSIDE STORY — For more information about large two-pole motors, ask your A-C representative for Bulletin 05B7550. Smaller cage motors are described in Bulletin 51B7693. Allis-Chalmers, Milwaukee 1, Wis.

Here are Some of the Features

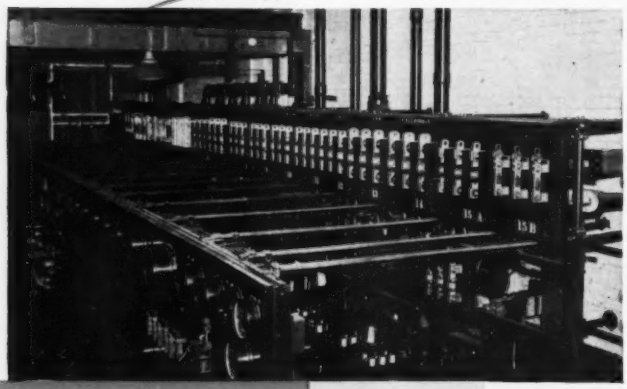
- Separate steel balancing rings to provide dynamic balancing without weakening the end rings.
- *Dew-drop* bars that give better performance and stay tight in the rotor core slots.
- Forged end rings, drilled to receive the cage bars.
- Oxygen-free copper or deoxidized copper-base alloy bars and end rings to prevent embrittlement from silver-brazing.
- Air distribution arrangement that eliminates hot spots in both the stator and the rotor.
- Ring-oiling adequate for prolonged emergency operation without forced-feed oiling.
- Equalizing air pressure chambers in the bearing housings to positively keep oil out of the motor windings.

ALLIS-CHALMERS A-C ALLIS CHALMERS

Anticipate* Destruction

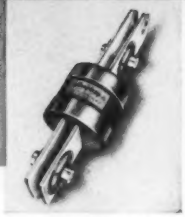
Amp-trap PREVENTS DEVELOPMENT OF HEAVY SHORT CIRCUIT CURRENTS

* To preclude or prevent by prior action — Webster



SHAWMUT Amp-trap*

"T.M. REG. U. S. PAT. OFFICE"



Amp-trap installation at Bird & Son, E. Walpole, Mass., raised the interrupting capacity of the system from 20,000 amperes to 100,000 amperes R.M.S. at 600 Volts, 60 Cycles.

NEW, LOW-COST SHORT CIRCUIT PROTECTION

Amp-trap, with its 100,000 RMS Interrupting Capacity, opens the circuit so fast that it *precludes* the development of the peak available short circuit current. Consequently, it *prevents* both magnetic and thermal destruction. Even phase-to-ground faults are cleared so quickly that multi-conductor faults are usually avoided.

CERTIFIED AND APPROVED

Amp-trap is listed by Underwriters Laboratories. Interrupting tests up to 202,000 amps at 500v 60 cycles have been witnessed and certified by Electrical Testing Laboratories, Inc. Amp-trap is favored by many insurance companies.

FOR SYSTEMS OLD OR NEW

Amp-trap is supplied in all standard ratings up to 4000 amperes for application on any circuit up to 600 volts AC or DC. It can be used on either old or new switchgear with a minimum of structural rearrangement. "Outage" time for installation is negligible. There is no better way to insure your investment in switchgear, bus-ducts, motor starters, circuit breakers and current transformers. Every service entrance on a network system needs Amp-trap protection. The list of Amp-trap users reads like the Blue Book of American industry. Investigate now.

"You Can Get Amp-traps"

WRITE FOR FREE AMP-TRAP BULLETIN TODAY.

REGISTERED UNITED STATES PATENT OFFICE Est. 1893

AMP-TRAPS — *Always At The Switch*

THE CHASE-SHAWMUT CO.

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

ELECTRICAL BOOKS

BEGINNING ELECTRICITY, by J. R. Eaton, 365 pages, 6x9, The Macmillan Co., $5.50. Beginning with electrical concepts used in all electrical apparatus, the text explains direct current, alternating current and electronic equipment; includes a discussion of meters and elements of modern communication systems. Primarily it is for the layman, whose home and life are increasingly dependent upon electrical equipment. The mechanical arrangement of parts in equipment is described and shown in diagrams but the operating principles are emphasized.

ELECTRONIC MEASUREMENTS, second edition, by Frederick Emmons Terman and Joseph Mayo Pettit, 707 pages, 6x9, McGraw-Hill Book Co. Inc., $10. Originally *Measurements in Radio Engineering,* the present volume covers measurement fundamentals in fields beyond conventional radio, including television, radar and other pulsed systems, microwave techniques; is suitable for engineers in other areas. Providing textbook material, it may serve also as an up-to-date handbook for practicing engineers. It gives basic principles of various types of measuring equipment and performance criteria, for help in selection and use of commercially manufactured apparatus.

ELECTRIC CIRCUITS AND MACHINES, second edition, by Eugene C. Lister, 427 pages, 6x9, McGraw-Hill Book Co. Inc., $5.50. A concise, over-all picture of the electrical field is given in the new edition of this manual, covering the fundamentals of direct and alternating circuits and machinery. Basic principles are presented with few mathematical explanations, the emphasis on principles and physical action rather than detailed analysis of theory. Illustrations, diagrams and pictures are included. Wiring diagram symbols have been revised.

ELECTRICAL ENGINEERING: THEORY AND PRACTICE, by William H. Erickson and Nelson H. Bryant, 523 pages, 6x9, John Wiley & Sons Inc., $6. This textbook was developed from material used in a sequence of courses given to mechanical, civil and chemical engineering students. Topics covered are circuits, machines and electronics. Physical analysis is stressed rather than mathematical. Diagrams and figures illustrate concepts and principles; problems conclude each chapter.

DIRECT-CURRENT MACHINERY, by Charles S. Siskind, 319 pages, 6x9, McGraw-Hill Book Co. Inc., $6. Assuming a background of elementary principles of electric and magnetic circuits, the subject matter progresses through fundamental theories of generators and motor operation, uses of auxiliary and control equipment, constructions and applications of present-day d-c machines and devices, and the development of many special machines now widely used. Topics are discussed in terms of fundamental principles and applications to present-day practices. Sketches and wiring diagrams emphasize the arrangement of machine circuit elements and simplification of complex wiring circuits.

. . and get

PERMANENT POLE PROTECTION

at LOWEST COST

with

Copperweld GROUNDING WIRE

Cut your costs and make your supply of copper go further by using annealed Copperweld* Grounding Wire, in place of copper. For pole protection, Copperweld saves 70% of the copper. What's more, it costs less than copper.

Remember, high frequency discharges travel along the outer surface of a wire. Because of this skin effect, Copperweld can carry lightning currents as well as a solid copper wire of the same size.

Copperweld Grounding Wire also discourages theft, as it is readily identified. Strong, yet pliable, it is easy to install and is permanently protected against corrosion.

The advantages of annealed Copperweld Grounding Wire have been demonstrated through installations in many localities. For further information on this dependable, low-cost, copper-saving product, write us today.

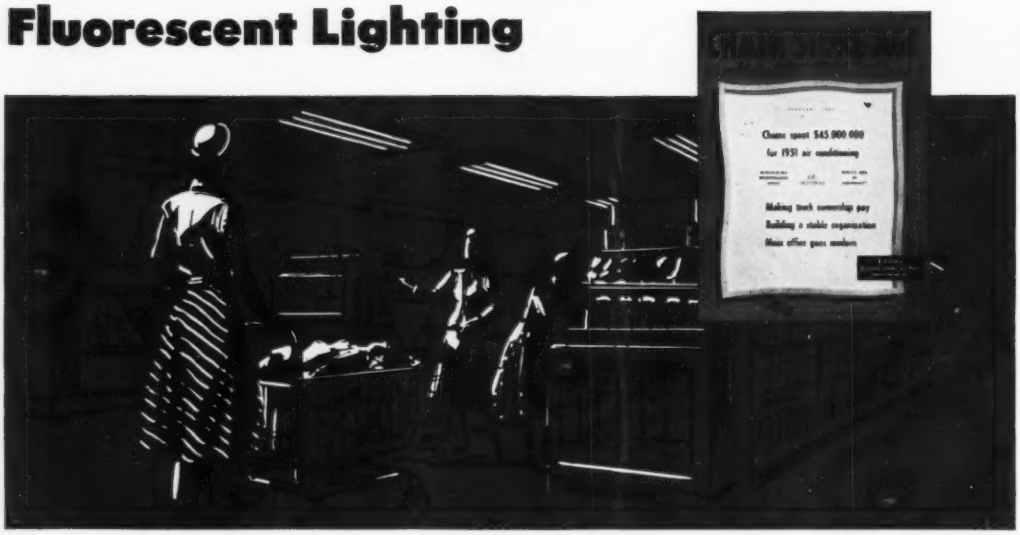
*Trade Mark

COPPERWELD STEEL COMPANY *Glassport, Pa.*

Pacific Coast Offices
Monadnock Bldg., San Francisco • Vance Bldg., Seattle

Copperweld Grounding Wire

Chain Store Age Recommends CERTIFIED BALLASTS for Fluorescent Lighting



CHAIN STORE AGE, in advising chain store operators on their selection of fluorescent lighting equipment, said:

"The ballast is the heart of a fixture. The surest way to choose a ballast is to look for the Certified shield . . . it is the only assurance of long lamp life. Inferior ballasts delivering wrong wattages result in low light output."

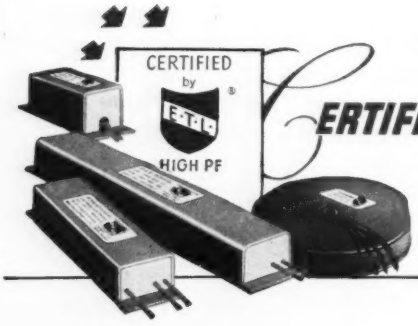
Experience has proved that CERTIFIED BALLASTS assure:

Full Lamp Life **Rated Light Output** **Maximum Ballast Life**

CERTIFIED BALLASTS are made to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

Write for complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer.

Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

These 500 MCM Deltabeston AVA cables carry 470 amperes —150 amperes more than standard 60 C cables of the same size. This can mean more current from your present conduit—extra current from every pound of copper.

How much extra current can AVA cables carry?

These standard 500 MCM 60 C cables carry 320 amperes — 32% less current than the same size G-E Deltabeston* AVA cables. Deltabeston cables permit operation at increased temperatures — offer more current per pound of copper.

If you're planning new distribution or changes in your existing wiring system, it will pay you to look into the savings of G-E Deltabeston AVA cable. Deltabeston can actually offer as much as 64% more current from your present raceways—can offer more current in most wire sizes.

Famous G-E No. 1799 varnished cambric and double-asbestos insulation make Deltabeston suitable for operation at high temperature. That's why *at normal ambient temperatures* it can handle more current than ordinary types.

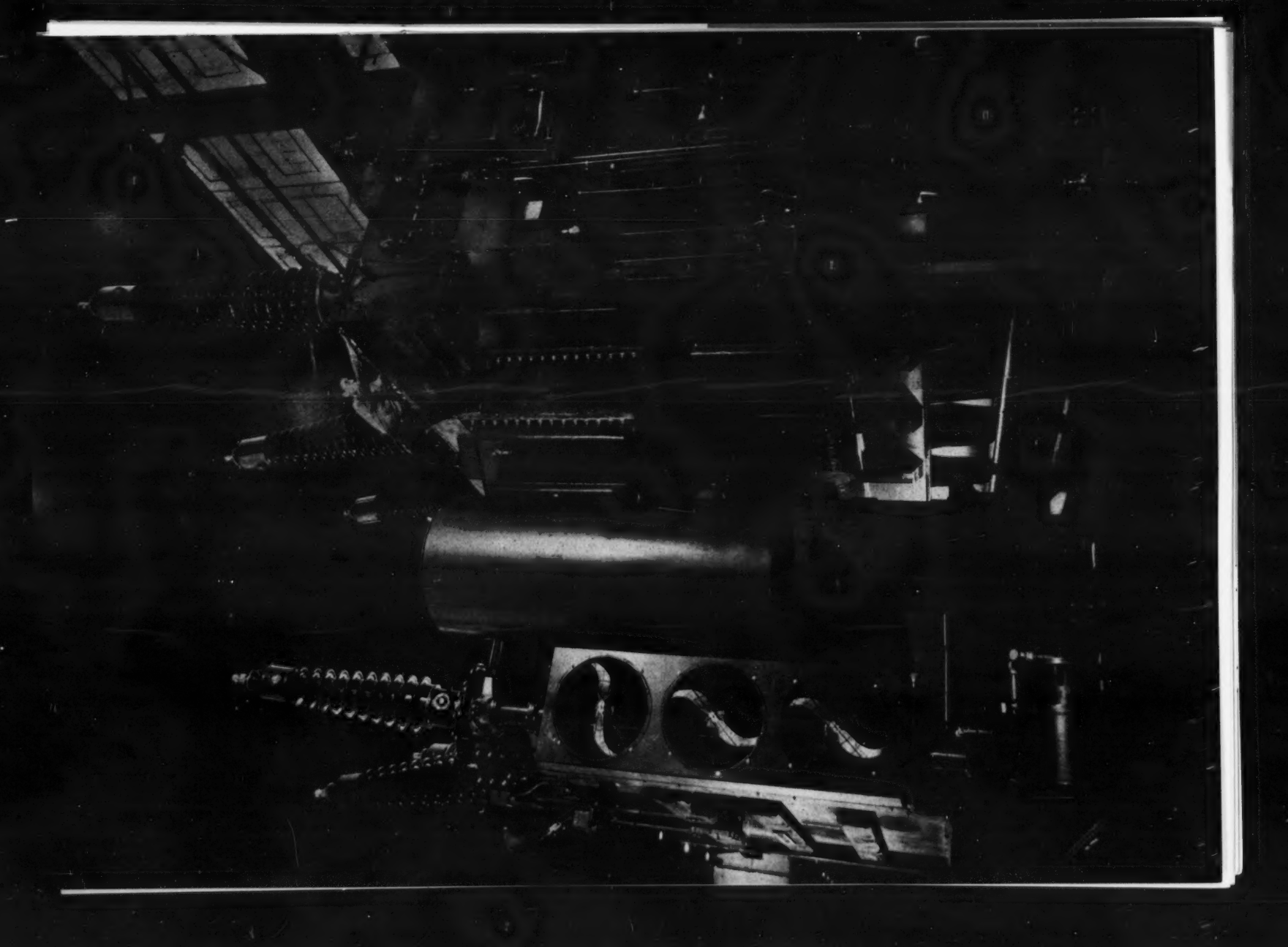
Before you wire or re-wire, check Deltabeston AVA cable. For information get in touch with your local G-E Construction Materials distributor, or write Section W24-825, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark of General Electric Company

Deltabeston
WIRES and CABLES
Built to beat the heat

You can put your confidence in—

GENERAL ELECTRIC



Meeting the Nation's Growing Power Load

Size no longer a barrier to Transformer Capacity

On paper, there's no limit to the capacity that can be built into a transformer. The prime stopper . . . size! Economical transmission of big blocks of power at higher voltages requires large transformers, that tax the capacity of ordinary manufacturing facilities and transportation to deliver them. The problem then . . . to boost capacity, but hold size and weight to deliverable limits.

More than a year ago, Westinghouse achieved a new peak of 145,000 kva. Recently, Westinghouse engineers raised the ceiling to 150,000 kva at 220 kv . . . in a Form-Fit unit. Form-Fit transformers can always be shipped more completely assembled.

End of story? No indeed! Transformer research, to keep pace with higher rated turbine-generator units, has been under way at Westinghouse for twenty years. Problems of weight and size are being solved as evidenced in the construction of a 190,000-kva transformer . . . within practical size, weight and cost limits. And . . . further than this . . . 220,000-kva Form-Fit units are even now on order and being designed and still will be shipped *factory-assembled*. Still greater capacity is on the way as the result of developments now in the laboratory stage.

This story of how Westinghouse engineers licked a tough problem is really a series of painstaking, individual development stories, all tied together by a keen insight into your needs today . . . tomorrow. You can count on this Westinghouse "thinking ahead" for all phases of utility service . . . it's keyed to the ever-changing, ever-growing needs of your system. J-97163

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Form-Fit Power Transformers

A Westinghouse innovation in basic design of large power transformers is Form-Fit construction. Pancake-type coils are mounted vertically with large parallel cooling ducts. The core, stacked through and around the coils, forms a protective shell with advantages in both mechanical and electrical strength. The large plate area of the coils results in distribution of lightning surges across the winding, eliminating the need for special shields, arresters, or other internally mounted protective devices. Because short circuits set up magnetic fields that tend to force high- and low-voltage coils apart, Westinghouse Form-Fit Transformers are arranged with high- and low-voltage coils interspersed, so that these forces actually work against each other. The Form-Fit tank slips down over this compact unit. Increased cooling efficiency of this design, plus more compact construction and lighter weight; makes possible ratings heretofore impractical . . . results in installation savings.

Network Transformers

In conjunction with a progressive utility group, Westinghouse pioneered the first secondary network installation in 1922. Since then Westinghouse has made important contributions to every major development in network transformer design, including the first three-phase units, the first low-loss, oil-immersed transformer, the first ventilated, Class B, dry-type transformer for indoor network service, and the first sealed, Class H, dry-type transformer for submersible and hazardous installations.

CSP® Distribution Transformers

Another development that has brought new operating economies to power distribution is the Completely Self-Protecting Transformer. It combines a distribution transformer with all its protective devices, factory-co-ordinated. These devices include H-V "De-ion®" arresters, protective links, and L-V thermal breaker complete with signal light and emergency control handle. These features protect against lightning, line lockouts, secondary short circuits, and transformer burnouts from overloads. In addition, they provide an automatic load check and permit emergency operation when required . . . assuring better continuity of service.

For information about these and other transformer developments, call your Westinghouse Electric Utility representative . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Penna.

ELECTRA'S HUSBAND

"WHY don't you tell the youngsters a bedtime story and get them out of my hair for a few minutes?" Electra said one evening during a vacation visit of two of her nephews and one of her nieces. "I've had them all day and they've got me reeling."

"I'll be glad to," I said, "but I ought to remind you of what you tell some of your middle-aged friends about the vicissitudes of raising their grandchildren."

"And I'd like to remind you that if we didn't bring the youngsters down here once in awhile, you'd never learn to be tolerant," she interrupted.

"Okay, okay, I'm not complaining," I continued. "I'll tell them a story I brought home from the office. Its about Killywinkles, the little microscopic organisms in the mountain streams that make electricity. It was dreamed up by Lester Davidson of the Shasta Division of PG and E. Come on kids, let's go in the living room."

When we were settled comfortably, I told them this story:

"This is the song of the Killywinkle
"As it whirls along the wire . . .
" 'I've left my ohm, forever to roam
" 'Burning with love's sacred fire.'

"Killywinkles, which are the source of electric energy, are microscopic bits of protoplasm that are present by the billions in the waters of our mountain streams. Left to their natural ways, they are extremely prolific. This is necessarily so because they are continuously expending themselves that other things may live. These tiny creatures, in addition to supplying the force we know as electricity, play a far more important role in the production of food. Without Killywinkles nothing will grow. They furnish an essential element in the reproduction process of all plant life. Without the presence of Killywinkles in sufficient quantity in the water used for irrigation, seeds will not germinate.

"Now the female Killywinkles are much more active than the males and outnumber them about 1,000 to 1. They are prone to follow the swift water in the main channel, while the slower males favor the quieter parts of the stream.

"Thus it is that when the water comes racing pell-mell down the penstock to be trapped in the squirrel cage and smashed against the water wheel, the centrifugal force squeezes the female Killywinkles toward the shaft of the turbine. This shaft, which is about 18 to 20 in. in diameter, is being driven at the rate of about 250 revolutions per minute by the force of the water pouring against the fins

of the water wheel. The frantic female Killywinkles are trapped at the base of the spinning shaft, with billions of other Killywinkles crowding in behind them and their only chance of escape is to climb the shaft. So they go streaming up its shining surface, urged onward by the press of the multitude behind them.

"In the meantime, the male Killywinkles have been screened off the edges of the stream and diverted into a slower water wheel, which has wires connecting with a huge, wheel-shaped apparatus called a rotor, which surrounds the top of the shaft. As they pass through the water wheel, they are spun dizzily around in a machine called an excitor, which does just what its name implies. It steps up the mating instinct of the male Killywinkle to the point of frenzy. Of course he has been separated from his 1,000 wives for a couple of seconds while this shift is taking place. Likewise, the 1,000 wives are separated from their husband, while being spun dizzily up the turbine shaft.

"These seconds are like days, or weeks, to the Killywinkles and when they meet for a fleeting instant at the top of the generator shaft, just dizzy with longing for each other, and dizzy, too, from the spin they've just had, the phenomenon of electricity takes place. It is the thrill of love emanating from the Killywinkles that creates the spark that we know as electricity."

Electra had slipped silently into the room.

"Cut it," she said. "That's no story for innocent young minds."

"Why these kids were raised on a farm," I objected. "They know the facts of life."

"That's right, Aunt Mary," the niece said. "You ought to see my rabbits."

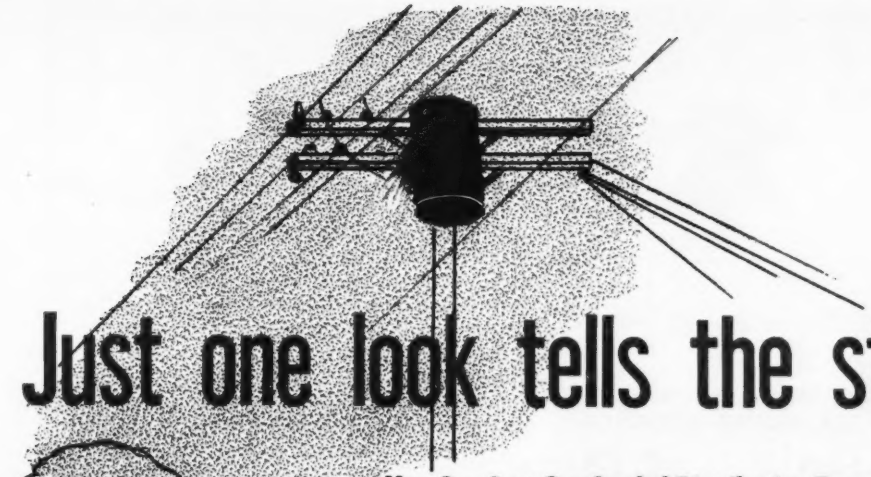
"I want to finish the story," I continued, "by telling them how the Killywinkles shoot out of the power house along the wires, all of the males on one center wire and the females on the two outside ones because there are so many more of them. As they rush along within sight of each other they sing a paean of love. That's the noise you hear sometimes under power lines and especially when your car radio is turned on. But the Killywinkles are just rushing pell-mell into oblivion. When all of these affectionate little Killywinkles are finally joined again by closing a switch in your home, their longing for each other bursts into flame and they are consumed in the heat of love's sacred fire.

"That's the flame that lights the lamps and cooks your meals and warms the electric blanket. It turns the wheels in factories. It's electricity."

"But, Uncle, how do Killywinkles make a refrigerator cold?" the youngest nephew (the Smart One, his aunt calls him) asked.

"That's another story I'll tell you tomorrow night," I answered. And I wondered to myself how Davidson would figure that one out.

COMIC books are presumably designed for children but a great many who should by age be accounted adult are avid readers of them, so much so that they are being used effectively to tell any number of stories. Labor unions have used them for propaganda, so have political parties. PG and E has made a kite comic to warn kids away from its power lines. Now appears a devastating one showing the ineptness of the national governmental administration, "Alice in Blunderland." It is sad but true.



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TODAY'S BIGGEST DOLLAR in overload detectors is the one you invest in *Thermalite* overload indicator, introduced by Allis-Chalmers. Big in value because it's economical to own and use, *Thermalite* indicator will make savings in transformer utilization and protection that return its original cost many times.

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The Allis-Chalmers overload indicator is available on distribution transformers 100 kva and smaller, 15 kv and lower.

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Dollar for dollar this simple, reliable transformer overload indicator is a tremendous value — worth checking into. Learn more about the *Thermalite* overload detector by contacting your Allis-Chalmers sales office today. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

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FLASHOVER DISTANCE LOST 16%
LEAKAGE DISTANCE LOST 32%

FLASHOVER DISTANCE LOST 68%
LEAKAGE DISTANCE LOST 83%

WHAT HAPPENS on your lines WHEN

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

FLASHOVER DISTANCE
LOST 1%
LEAKAGE DISTANCE
LOST 7%

AN INSULATOR PETTICOAT GETS KNOCKED OFF?

If damage from flashover and mechanical attack is a major cause of transmission insulator replacement on your system, consider this fact. Lines on Lapp Line Post insulators almost never suffer outages due to insulator failure. In fact, most operators don't even bother to replace Lapp Line Posts that have flashed over or have been hit by stones or bullets. The reason is in the Line Post design—flashover or mechanical attack, of severity sufficient to shatter ordinary insulators, will break off one or two petticoats at the most, leaving the Line Post body intact, flashover and leakage distances only negligibly decreased, essential efficiency unimpaired. The result is in the maintenance records of hundreds of companies—records showing that *lines on Lapp Line Posts have fewer outages, require fewer insulator replacements and less maintenance than comparable lines on any other type of insulator.* The odds are all on your side when you build your transmission lines on Lapp Line Posts—for maximum performance, maximum economy.

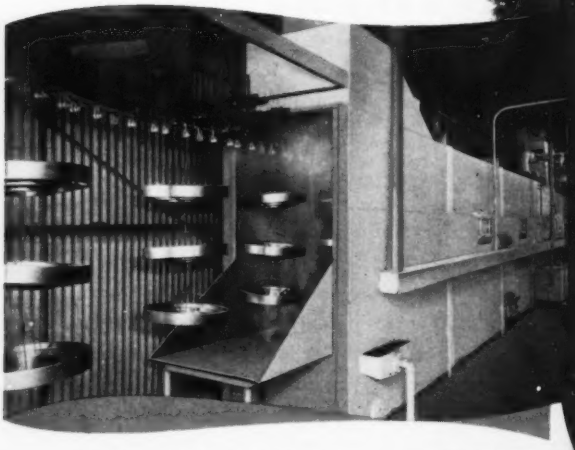
Good Lighting

as important as your most important tool!

Just imagine the level of production you'd get in a blacked-out plant—or with illumination that is inadequate or worked only at whim. It's important—as important as fine tools and skilled men—to make sure your plant is equipped with lighting that won't let you down!

Smoot-Holman lighting equipment is built to specifications that do not compromise with quality. Whenever called upon, it dependably delivers the right amount of illumination in the right places. It relieves eye-strain, reduces fatigue—promotes accuracy on close tolerance jobs.

You take pride in your equipment and workers—why not add to their performance with Smoot-Holman lighting?



Yes we're proud of our precision "tools" too. Here raw metal is being treated against rust and corrosion in one of the finest high temperature chemical baths in the Nation.

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AUGUST 1952 Vol. 109, No. 2

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

WHICH WAY SHALL WE MOVE — RIGHT OR LEFT ?

Six hundred people who heard Carl Taylor's inspirational address before the PCEA agreed unanimously his was the finest discourse of its kind they ever heard. Electrical West made a tape recording of his extemporaneous masterpiece. Since then twelve copies have been made of the recording and hundreds of requests have been made that we print the Taylor address. Here then is a condensation of his hour-long talk. Every man and woman in the industry should read it for it spells out a heritage and tells how we may lose it.

What Kind of an America Do *You* Want ?

Carl Taylor*

President, Waukesha State Bank
Waukesha, Wis.

WHAT kind of an America would you like to live in tomorrow? What kind of an America would you like to leave for your children the day after tomorrow?

The peoples of all of the earth in the last ten years have done more to change the way they live than all of the people in history put together ever did in five centuries of life. We're in the middle of one of those great historical revolutions in the thinking of people in the organization of their lives. And I'm not just talking now about the political organization of life. That's only a small part, albeit an important one. I'm talking about those basic fundamental things that go to make up life.

When I talk about "What kind of an America do you want tomorrow," I'm thinking about your right in your declining years to have the proceeds of your youthful savings and what is more important the right of our children — yours and mine — to choose whether they want to own a farm and farm it, or whether they want to own an electrical business and run it, or whether they want to be in a profession such as medicine and have freedom to work in it. Their right to think out loud the things they want to think. Their right to keep a little bit of what they earn so that they may have the privilege of deciding what to do with their own surplus—which is one of the basic freedoms and once it's gone no other freedoms are important. Their right to worship God according to the dictates of their conscience. Their freedom to have enough left of their earnings to live on. And the peoples that are in the areas of the earth where about seven-eighths of all the people alive today live have lost those rights.

Now there isn't anything political in what I want to say—because Harry Byrd and Senator Taft think alike on this subject, and one is a Democrat and one is a Republican. And because Senator Pepper and Wayne Morse think alike on this subject, and one is a Democratic senator and the other a Republican senator. This thing far deeply transcends and undercuts any thought of a political alignment because it isn't a political alignment. It's a great, deep fundamental decision now being made by the peoples of the earth about the way they want to live tomorrow.

*Based upon an address before the PCEA convention, Coronado, Calif., June 13, 1952.

What Kind of an America Do YOU Want?

Starts on Page 67

I've read the histories of all of the peoples who left a recorded history of their doings, and there are just two ways by which men may organize their living. One of those ways is represented, shall we say, far down to your left. Simply stated, it is the kind of life in which all of the common folk down below like you and me delegate to some people up at the top—or lose to them—the power to do the thinking, the power to do the planning, the power to do the owning—and become the servants to their masters. You can see it in Russia where the Comintern representing less than 2% of the people owns 100% of the property.

We saw that come to pass in Germany as Hitler came to brutal and ruthless military power and in a little while had taken over the right of ownership of all of the great industries of Germany and the right of free speech of all the people. We've seen the British Isles, the natural inheritance place of the freedom we once knew in this country, go far enough now that no farmer may own a farm in excess of 50 acres, no man may own a trucking concern that operates more than one truck, all the coal and electric power and other great industries have gone into the hands of government.

Here in America we have the kind of life that men may build for themselves, which is represented—shall we say—far down to your right. It's the kind of life for ordinary folk like you and me. We're the sovereign kings. We're the masters of our own destiny. We make up the kind of rules under which we live and we choose the people that are going to administer those rules. And we reserve the right to change both the rules and the people who administer them.

Now we are in a great testing field all across the earth to determine whether people will live better if we move down this way to the right, as we have done for a century and a half, or whether we will live better if we move back down this way to the left—toward which all people living are moving at a tremendous rate.

In the last four national plebiscites that have been held in this country, covering a period of 20 years, the majority of those who expressed an opinion expressed the belief that we would live better if we would increase the power of government and surrender individual liberty. And we are still moving in that direction. Across the horizon, plainly visible to any one of us, are socialized medicine, federal control of education, increased ownership by the government of utilities, the constant growing intent and purpose of the government itself to take from us the individual liberties that we have to farm our land, to own our factories, to employ our professional people and to place all these powers in the hands of government. And the proportion of our income—which normally would belong to us so that we may keep it at home and by our own free will contribute it for the construction of churches, the construction of schools, or the patronizing of the local pub, or whatever we choose to do with it—that's the proportion of our income that represents freedom. Our income over and above bare subsistence is moving now into the hands of government, so that the decision is no longer made in Coronado or in Waukesha or in any other community of our nation as to what the local earnings of money in those communities will be spent on. The decision is made by a few folk at the seat of government in Washington.

Let's Take a Look

This country of ours is the newest organized civilization in existence. It represents one of the smallest of the great civilized groups from the standpoint of population and from the standpoint of land area and in this short while let's get a look at the comparative development. We own four out of every five of all the automobiles there are in the world in the United States, and the remaining one-fifth of the world's automobiles are more than half of them less than 12 hp and will carry less than three passengers.

On our farms, the poorest paid worker, who works full time and does the hardest job, can take six months of his gross income and buy an automobile. It will not be a new one but it will be a good one and it will take him any place he wants to go. (And he would probably have been better off if he had stayed home in the first place.) If he lived in England, the next nearest country in mechanical and material development to our own, and if he were the president of an electrical manufacturing company of moderate size, or if he were the president of a little country bank, or a successful doctor, or the best skilled laborer in England, it would take him five times as long to buy an automobile and the car he got would be 12 hp and for the last 12 years he couldn't have been allowed any gasoline by the government to run it. If he lived in France or Germany prewar, in the best days the continent of Europe ever saw, it would take him eleven times as long (5½ years) to get enough money to buy a little dinky-type automobile.

If You Lived in Russia . . .

If you lived in Russia and were part of the 2% of the really criminal class who constitute the top members of the Comintern, it would take you fifteen years of your gross income to buy an automobile—if you got one then. Around the earth where about three-quarters of the world's people live, all the money you earned in a lifetime wouldn't buy an automobile.

Now Waukesha is a little one-cow county seat town. I would call it a one-horse county seat town but we got rid of the last horse we had in the county about ten years ago. There are more refrigerators in the homes of the working people and the farmers of Waukesha County than there are in the homes of all of the people in London, England. And there are more refrigerators in the homes of the people in Los Angeles than there are in the homes of all of the peoples all over the earth put together, outside of the United States.

I think I've learned from people wiser than myself, and proved with my own observation and my own reasoning, what made this land the great and wonderful country that it is. And it's a very simple thing.

The simple fact is that here in this land for the first time in all the history of men we adopted by common consent a philosophy that's stated simply like this—you can do anything with your life that you want to do with it; and we will reward you proportionately as you do good for other people. Our forefathers wrote that first into their hearts and into their minds. And then they began to transfer onto the pages of the Declaration of Independence that fierce independence that demanded the right to do what they wanted to do. They refused to let King George tell them whether they could drink tea or not, or how much their taxes could be. They wrote those same doctrines into our Constitution of the United States and into

the constitutions of various commonwealths of this nation as they came into being one after another. Do whatever you want with your life and we will reward you proportionately as you do good.

How Far Have We Gone?

Now I would like to tell you what we have done already to destroy this land of ours. I think I can show you quickly how far we have gone. Many a keen student of the affairs of human kind tells me that we have gone too far already and can never turn back. I believe that England never can turn back. In the life of the youngest child in England, they never will turn back. They're going to be regimented, socialized, they're going to be equal—and they're all going to be hungry. And many people tell us we've gone too far to escape the same fate.

You think the farmer is free. Well take a look at the case of Tom Filburn. Briefly Filburn raised more wheat on his farm than the AAA said he could. When he could not sell his wheat without taking a terrific penalty, he fed it to some hogs. Ultimately he butchered the hogs and sold the meat.

About two weeks after he sold the meat, a large automobile with two U. S. marshals pulled up in Filburn's yard and they gave him a warrant charging him with criminal violation of the laws of the U. S. Filburn fought the case through the federal court, through the federal court of appeals, and through the U. S. Supreme Court. And the U. S. Supreme Court, by a large majority, told Filburn he was a criminal. They said that he couldn't grow that wheat and feed it to pigs in this country. "You must purge yourself of this crime and cease doing it." Today that is the law of the United States as interpreted under the Constitution.

You'll say it's good enough for the farmer. He's a dumb cluck anyhow. Never knew enough to take care of his affairs, so maybe they'll look after him. Let the government tell him how to take care of himself.

Wait a minute now. These same people, after they got the Supreme Court to read into the Constitution the government's power to tell a farmer what he could grow, said, "Those greedy guys who manufacture electrical equipment can hire people to use the equipment. But they never thought to care for their employees and they never will—unless we, the planners, with the power of government, step in and make them treat their employees right." So they passed a law that said you couldn't hire a man for more than 40 hours unless you paid him time and a half for overtime and you couldn't pay him less than 40c an hour—now 75c an hour—and so they protected all these men that worked for you against your greed and your terrible way of treating them.

Five fellows who ran a furniture factory in Dallas, Tex., couldn't manufacture this furniture by hand sufficiently fast to sell it for a labor price of 40c an hour. They went into the federal court and said, "Look, there's a guy up in Grand Rapids who has a machine. He puts hickory logs in one end and chairs and tables fly out the other end of the machine and we can't pay 40c an hour to hand make the furniture." The judge looked over the edge of the desk and didn't give them any satisfaction. He asked them why they didn't go on relief as they ought to in the first place if they couldn't work better. So the case went on to the U. S. Supreme Court and the U. S. Supreme Court said, "Yes, under our Constitution the government has not only the right but the duty to protect these laboring people from you." And today the government of the U. S. has an absolute right to tell you and your workmen how many hours a week your men can work and how much they have to be paid.

Now They Look at You

You say it's good enough for the laborer. He never had any sense anyhow. But now they took a look at you and they said you guys make a lot of money and if we just had the money you make, we could sure do a lot of things for humankind. We could give Joe Stalin a billion dollars so that he would be strong, and we could give anybody anything we want to give them, and we will be great guys because we can distribute wealth. We'll take out of Waukesha $8 million a year and give them back $750,000, and we'll make them come to Washington on their knees to get it.

So they passed that federal law allowing them to take the surplus of the income money that ought to belong to the earner to do with as he pleases. The wealthiest of us pays about 92% of his income and the humblest and simplest of us pays more than one-fourth of what he earns.

The government said, "This law will let us take what we want to take out of your wages." In fact, they even say that you people have got to take it out of the other fellow's wages before you pay him. While that has never been tried before the court, the government will probably say yes, that the government of the U. S., under the Constitution, has the power to make you take out of another man's wages whatever amount they want paid and send it to them.

I would like to ask you simply and humbly—and if there are any of you in this audience who believe in that kind of business that's your privilege—how far do you think the government will have to go in this country in taking away the basic fundamental rights to farm your land and sell your labor and keep your earnings, before you say to yourself, "Wait a minute, that's a little too much? Let's stop this big socialistic government."

You sit back and say, "Well, the Constitution protects us. I'll let somebody else worry about it." And half of you never went to vote and not ten in this audience ever turned a hand to help preserve this land because you thought somebody might get mad and quit buying stuff from you if you spoke up what you thought.

But I want to tell you this. The Constitution of the United States absolutely prohibits, by every capacity of carefully phrased language, absolutely prohibits the government from telling the farmer what he can grow and what he can't. But what good does that do Tom Filburn? Every phrase of the Constitution absolutely prohibits the government of this country from passing a law saying a man can't work 50 hours for 20c an hour if he wants to. But what good does that do? The law's passed and the court said it was constitutional. The Constitution absolutely prohibits the government taking these freedoms away from the people. But you and I have been the kind of worthless citizens, so busy enjoying the heritage that our fathers gave us, that we didn't have the courage or the patriotism or the wisdom to raise a hand in protest. And so the government socialist bureaucrats and the leftist labor leaders and the political shysters have gotten control of the people.

Have You Read the Manifesto?

How many of you have read the Communist manifesto and know what's in it? Your sons and your grandsons and your neighbors' sons are dying in Korea to keep this philosophy from becoming the governing philosophy of America. That's the price we're willing to pay or have our children pay to keep Communism from coming to America but, unfaithful citizens that we are, few of us have taken the

What Kind of an America Do YOU Want?

Starts on Page 67

trouble to learn what Communism is.

The Communist manifesto has a number of sections in it that outline what they will do to the home and the church. But you're business men and the Communists think we can think faster in business terms so it has a section in it stating how to communize America through its business life. In it are ten rules like the Ten Commandments which are the backbone of the Communist economic religion stating what must be done to America and England to communize us. I'd like to quote them verbatim.

Here is No. 1 of the things the Communists themselves say in the manifesto they need to do to make America Communist. "No. 1: Establish a heavy, progressive, graduated income tax." That's not the Democratic Party platform. That's not the Republican Party platform. That's the Communist manifesto program to communize America. Did we do it? Well don't be silly. We've got the highest progressive, graduated income tax any country ever had.

Well we adopted it. Why? Because we are adopting the economic platform and program of the Communist Party in the federal government of the United States.

Here is rule No. 2: "Establish a heavy progressive inheritance tax." Have we done it? One of my associates and friends, a man named Arthur Davidson, together with his brother and a man named Bill Harley, 30 years ago established what you may know as the Harley-Davidson Motorcycle Co. The company was highly successful. These men worked night and day and risked everything they had to make it succeed. On the 30th of last December at 1 o'clock in the morning Arthur Davidson and his wife were killed in a common automobile accident and I became an appraiser of the estate. Seventy-four per cent of all of the property that he left that should have gone to his two sons and daughter went to the government of the United States in a high progressive, graduated inheritance tax, causing the control of that company to pass to the government of the United States or to strangers when it had to be sold.

Why do the Communists want a highly progressive, graduated income tax? Well the problem is just as simple as adding two and two. It's strictly anti-Christian and it destroys every virtue that's good. They want hate for love, and darkness for light, and lies for truth. Economically, on exactly the same scale if a man succeeds, they want him called an enemy of the people, an economic royalist or an apostle of greed if you want to translate it into New Deal English. Then they say to him, "The more you make, the harder we'll take it away from you." The reason is that the Communists know that they never can take this country over man by man, that they have to get all the power in the hands of a few men in government and then they just have to take over a few and they've got the job done.

How Hitler Did It

I wondered how Hitler got the Norwegians in six hours on the morning Stevanger went under. My daughter this last year married a Norwegian. Her brother-in-law was going to Norway and I asked him to get the answer. He came back with a simple tale of what happened. He said all of the utilities in Norway were in the hands of one man in the state and all of the communications in Norway were in the hands of one man in the state and all of the defenses in Norway were in the hands of one man in the department of defense and all of the railroads in the hands of one man. Hitler only had to take over eighteen men and he had them bought before he came. But the Norwegians didn't want Hitler and 12% of the male population of Norway died fighting to get him out. But they never would have got him out if it hadn't been for the great reservoir of free men over here along the Pacific and the Atlantic who poured out their lives and their energies to win freedom. But who's going to get our freedom if we give it up the same way?

I could read the other sections of the manifesto but they're all the same: the centralization of credit in the hands of the state, the chartering of state corporations like the TVA and the Columbia Valley Authority in the hands of the state, owned by the state, etc. It's so very simple, you see, because all they have to do is tax you to get money to build a free plant and sell the electricity to the public for less than cost, including all the waste, and say to them, "Look what the government can do. Those nasty utility people charge you too much for a kilowatt-hour of electricity and look how cheap we can do it." And it's a lie. But you and I didn't tell the people that it was a lie. We may have whispered it but they didn't hear us. And when we didn't we failed as Americans.

The Communists want the centralization of the means of communication and transport in the hands of the state and the consolidation of agriculture under controls by the state. The whole ten of them are the same. They're as simple as the writing of English can be in the Communist manifesto.

You Are Responsible

We have already adopted approximately 80% of the economic program of the Communist Party. You did it. Don't look around at anybody else. Don't look at any corporation. Just look at yourself because you're the one who did it. You're a director in this corporation called America and you just add up what you have done to try to educate yourself with facts and persuasion so that you could tell other people. Often somebody says to me when I talk to an audience of influential people who carry a lot of responsibilities, "You're talking to the wrong people, you ought to go talk to the men who work for me." My answer is that you're the fellows that I've got to talk to because the men who work for you look to you for economic guidance. If they were as smart as you are, you would be working for them. If you have the responsibility for their economic guidance, you absolutely have the full responsibility for their guidance in affairs of patriotism. If you worked a tenth as hard to teach them what was wrong with Communism and New Dealism and State Socialism and Nazism, all of which are the same thing—a few gangsters running us all—if you worked a tenth as hard to tell them the truth as you work to tell them where to put a generator and how to keep the power flowing, we never would have lost the freedom that we've lost in this wonderful land of ours.

So I repeat, "What kind of an America do you want to live in tomorrow? What kind of an America do you want to leave for your children and your children's children?" Only a moment's look will convince you that it's going. Some folks say it's gone. I think we still have yet another chance this year. What kind of an America do you want tomorrow? Do you realize we're losing it? What are you *personally* willing to do to help preserve this greatest heritage God's children have ever known in all of human history?

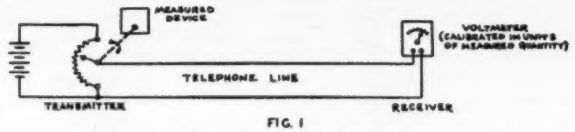

FIG. 1
SIMPLE POTENTIOMETER TYPE OF TELEMETERING SYSTEM

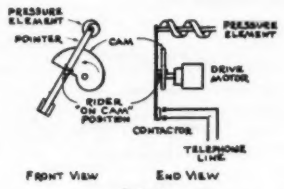

FIG. 2
SKETCH SHOWING PRINCIPLES INVOLVED IN PRODUCING VARIABLE LENGTH PULSES FOR TELEMETERING

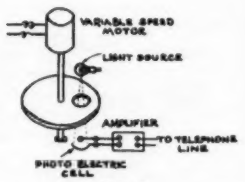

FIG. 3
SKETCH SHOWING PRINCIPLE OF PULSE RATE TELEMETERING TRANSMITTER

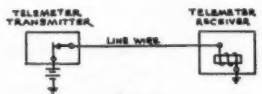

FIG. 4
ELEMENTARY NEUTRAL TELEGRAPH CIRCUIT FOR TELEMETERING

FIG. 5
ELEMENTARY POLAR TELEGRAPH CIRCUIT FOR TELEMETERING

ABC's of Telemetering Systems

R. H. Miller

General Superintendent of Communications
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Telemetering of many quantities, such as pressure, flow, volts, amperes, watts, etc., has become widely used, in the past few years, to bring information to centralized control points and to eliminate the necessity of maintaining attendance at less important locations. Because of its economic advantages, the application of telemetering is of interest in many branches of industry. Hand in hand with telemetering, remote or supervisory control of equipment is often applied, making it possible for one control point to have complete information on the operation of a system or process and to completely control it at a lower cost and often with more complete information as to conditions than would be possible with manual attendance.

Even with its present wide application, the basis of the operation of telemetering systems is frequently not understood by persons who are interested in methods of reducing operating costs and consequently are not able to take maximum advantage of the potentialities of such techniques. The purpose of this article is to outline in simple terms the basis of telemetering and to point out some of its possibilities and limitations. It will be attempted to accomplish this discussion in relatively nontechnical terms and no attempt will be made to give a detailed description of any particular system. Rather, the usual methods of remote metering will be discussed and various basic means of conveying information from one location to another will be described.

Several methods can be used to convey metered information from one location to another, for example, by mechanical, pneumatic, hydraulic or electrical methods. Electrical methods, because of fewer limitations of distance and the possibilities of transmitting many quantities simultaneously, are almost universally used for telemetering and will be the type discussed. Frequently, also, voice-communication channels are available between desired locations and simultaneous transmission of voice and telemetering is both economical and practical.

The problem of telemetering can be broken down into two main parts:

1. The production of an electrical impulse varying in length, amplitude or frequency, proportional to the quantity being measured.

2. The transmission of the impulse to the receiving location, where an indicating instrument is used to show the quantity being measured at the sending end.

Perhaps the simplest method of telemetering is the varying of current in an electrical circuit, the variation being proportional to the changes of the quantity being measured. Such a system consists of a simple potentiometer, controlled by the measured device so that a voltmeter at the receiving terminal can be directly calibrated in units of the measured quantity. A simple schematic diagram of such a potentiometer system is shown in Fig. 1. Although a system such as described is very simple, there are several limitations to its use, some of which are enumerated below.

1. The distance over which the system can be successfully operated is limited.

2. Variations of line resistance, because of temperature changes, bad joints, etc., affect the calibration of the system.

3. The leakage conductance of the line insulation, which may vary with weather conditions and affect the accuracy.

4. Variations of battery voltage at the transmitter will change the reading of the receiver.

For the reasons outlined above, a simple potentiometer-type telemetering system is rarely used, except for short distances, within a plant, where the factors affecting operation of the system can be controlled.

In the more usual telemetering methods, an interrupting device is used at the transmitter, causing pulses to be produced that vary in length or frequency of recurrence, proportional to changes in the quantity being measured. Variable-length pulses are usually produced by a cam, operated by a constant-speed motor, and electrical connection being made to contacts, depending on the position of a contact arm riding on the cam, which in

turn is controlled by the magnitude of the measured quantity, e.g., gas pressure, flow, etc. Variable-frequency pulses are conveniently produced by breaking a beam of light with a perforated disk, driven by a motor whose speed of rotation is proportional to the measured quantity. The interrupted light pulses are beamed onto a photoelectric cell, so that an electrical impulse is obtained for transmission to the receiving equipment. Figs. 2 and 3 illustrate the principles involved. Various other arrangements can be used to produce pulses for telemetering, but the brief discussion above should suffice to describe the principles that are generally used.

Translating Signal

At the receiving end of the telemeter system, electromechanical devices are used to convert the electrical impulses received over a telephone or telegraph transmission line into mechanical forces to operate an indicating instrument, calibrated in units of the quantity being measured. For the variable-pulse-length system, the telemeter receiver consists of a motor drive, geared to a shaft with a magnetically operated clutch. The time for operation of the clutch is determined by the length of the received impulse, and consequently serves to position the receiver pointer. In the variable-frequency system, a frequency-sensitive electrical system, similar to a discriminator detector in a frequency-modulated radio system, is used to convert the variable rate impulses into a variable direct-current voltage output proportional to the measured quantity and is used to actuate a d-c voltmeter that is calibrated in the desired units. Various other electromechanical schemes can be used to receive telemeter signals and operate indicating devices, so that a complete description is beyond the scope of this discussion. Details of various types of equipment can be obtained from manufacturers. Of more interest in a general discussion of telemetering are the capabilities and limitations of the different basic methods and problems encountered in transmitting signals over considerable distances. A discussion of these factors will be included to serve as a guide in selecting the general type of equipment best suited for a particular application and to point out the factors of telegraph transmission that must be considered for operation of such a system.

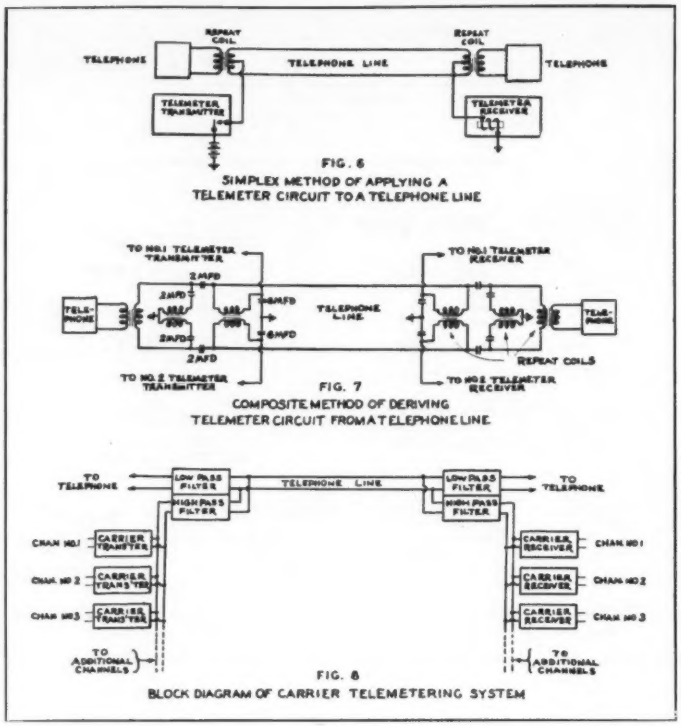


FIG. 6
SIMPLEX METHOD OF APPLYING A TELEMETER CIRCUIT TO A TELEPHONE LINE

FIG. 7
COMPOSITE METHOD OF DERIVING TELEMETER CIRCUIT FROM A TELEPHONE LINE

FIG. 8
BLOCK DIAGRAM OF CARRIER TELEMETERING SYSTEM

After being provided with devices to produce telemetering pulses and to translate such pulses into an indication of the measured quantity, the setting up of a telemeter system is primarily one of telegraphy. In place of sending coded pulses produced by a hand-operated telegraph key, the telemeter equipment mechanically produces pulses and the telemeter receiver receives and translates the pulses into an indication, in place of a telegraph operator listening to a sender and mentally making such translation. In other words, in telemetering, just as in a hand-operated telegraph system, information is being transmitted by telegraphic means to the receiving terminal and an understanding of some of the principles of telegraphy is essential in engineering a successful telemetering system.

Type of System

In setting up a telemetering system, it is first necessary to determine what type of a telegraph system will be used, e.g., a d-c telegraph line or a carrier system. Whether the circuit is to be operated on an existing telephone line or a simplex or composite basis or by use of carrier, all pose problems, both technical and economic. Also to be considered are the factors of telegraph transmission that will be encountered, as follows:

1. Number of channels required.
2. Circuit length and attenuation.
3. Signaling speed and band width requirements.
4. Effects of electrical disturbances (noise) and signal to noise ratios.
5. Distortion of signals and effects of distortion on the accuracy of the system.

The simplest telegraph system is known as a neutral circuit and may work over a metallic circuit or with one wire against ground as shown in Fig. 4. In this case, the signals are transmitted by opening and closing the circuit by the transmitter contacts and the signal consists of d-c pulses actuating the receiver element. This type of a telegraph circuit is subject to considerable limitation because of telegraph distortion resulting from the distributed inductance and capacity of the line. As a consequence, neutral circuits are ordinarily used over only short distances.

A polar telegraph circuit has considerable advantage over a neutral circuit in that the effects of distortion because of circuit constants are balanced out, and the effects of induced noise are minimized because current flows in the line at all times. The polarity of the line is alternately changed from positive to negative, depending on whether the circuit is sending a marking signal or not sending a spacing signal. In order to set up a polar circuit, polar relays are required to alternately connect to the positive or negative battery. Fig. 5 shows an elementary polar telegraph system.

Simplexing

Both of the telegraph systems just discussed require the use of a telegraph circuit dedicated to the transmission of the telemeter signals. Various means are available to make use of a telephone line for telemetering and at the same time still permit the transmission of voice signals. The economy of such an arrangement is obvious, particularly as telephone lines are often already available and, when the additional telemetering requirements can be met without the construction of an additional line, the cost of the telemetering is greatly reduced. Two general methods of accomplishing this operation on physical telephone lines will be briefly discussed.

The simplest method of making use of a wire telephone circuit for simultaneous telemetering is by simplexing as shown in Fig. 6. The midtaps of the repeat coil are used to connect to the telemeter equipment. With this arrangement the telegraph signal current divides in the repeat coil winding and with balanced line conditions the two wires are at the same potential, so that no voltages are induced in the drop windings of the repeat coils and the telemetering or telegraph signals will not be heard in the telephone instruments. The system shown in Fig. 6 uses a neutral telegraph system, but could also be used on a polar basis.

Another arrangement that will provide two telegraph or telemeter circuits simultaneously with a physical telephone is known as compositing. The circuit arrangement of such a setup is shown in Fig. 7. The telemeter equipment in this case would be connected to the lines as shown in Figs. 4 or 5. Low-frequency ringing on a magneto telephone system would be affected because of the reactance of the series condensers and this system is consequently limited in application in such cases.

By means of carrier systems, a large number of simultaneous telemetering signals can be transmitted. A carrier system uses electronic methods, where tone frequencies are produced by vacuum tube oscillators and by using receivers tuned to the tones it is possible to transmit several telemeter signals at the same time and retain the use of telephone circuit. The applications of carrier devices are practically unlimited and consequently are rapidly gaining popularity for telephony, telegraphy or telemetering, and supervisory control. Considerable economic advantage is realized by the use of only one pair of wires for transmitting a large number of simultaneous channels of information. Carrier channels are also adaptable to use on microwave systems and, in many cases, microwave systems are more economical than wire lines, particularly on long circuits and where a great number of channels are to be transmitted. As this article is dealing primarily with principles of telegraphy as applied to telemetering, a description of carrier equipment and micromave systems will not be included. Fig. 8 shows a block diagram of a carrier system such as is commonly used for telemetering purposes. The carrier frequencies are separated from the telephone channel by means of the high and low pass filters indicated in Fig. 8 and each of the carrier channels operates on a frequency different from that of the other channels, so that simultaneous operation of the various channels is possible.

The preceding discussion has outlined the methods of producing telemetering signals and has described various means of telegraphing these signals to the receiving equipment. In order to complete the discussion, some of the limitations and requirements of such systems for telegraphic transmission of telemetering signals appears to be in order. One of the considerations in any telegraph system is the signaling speed required to transmit the information. When a circuit is interrupted to send coded signals, or pulses in the case of a telemeter system, the total time from the start of a signal pulse to the time for the start of the next signal pulse is the period of the signal. The time that the signal is being transmitted is known as the mark and the time of no signal is known as the space. The reciprocal of the period gives the frequency or signaling speed of the circuit. Because of the fact that in telegraph systems pulses or square waves are being transmitted, it is necessary to transmit a band of frequencies up to at least three times the signaling speed in order that the square wave pulse can be reproduced at the receiver. In pulse length telemetering systems, the signaling speed is very low and the band width requirements are consequently small. In variable-frequency systems the signaling speed is considerably greater than for pulse-length systems and greater band widths are required.

Noise Affects Accuracy

Telegraph distortion is the increasing or decreasing of pulse lengths at the receiver output, because of effects of the circuit constants, the time required for operation of relays and effects of noise on the telegraph system. Distortion will appear in a telemetering system as a percentage error in the telemeter receiver indication. If the distortion is constant, calibration of the receiver can correct for it; however, it is desirable that distortion be held to a minimum in order that the accuracy of the telemeter system can be maintained. A polar telegraph system is inherently less subject to distortion than a neutral system, and in car-

Because of its economic advantages, the application of telemetering is of interest in many branches of industry. The basis of operation of telemetering systems is frequently not understood by those interested in methods of reducing operating costs. Consequently they are not able to take maximum advantage of the potentialities of such techniques. If the ABC's of telemetering are better understood it should permit wider application of this most useful tool.

rier telegraph applications a frequency-modulated or frequency-shift carrier system will introduce less distortion than an amplitude modulated carrier system.

Noise Factor

Noise picked up on a telegraph system will introduce distortion and, if severe, may even cause the telemeter system to be inoperative. The ratio of signal to noise at the receiver is the criterion of performance in any communication system and consequently the length of the circuit that can be operated without repeaters is governed by attenuation of the signal due to circuit constants and noise pickup. Polar telegraph and frequency modulated carrier telegraph systems are less affected by noise than are neutral telegraph and amplitude modulated carrier systems and consequently can be worked over longer circuits where attenuation and noise conditions would preclude the use of neutral telegraph or amplitude modulated carriers.

Before concluding this discussion, a few comments on the basic limitations of the various types of telemetering systems seem desirable. It was mentioned earlier that usual telemetering systems use variable-length or variable-frequency pulses. An obvious system using variable-amplitude pulses was omitted because of the fact that it is rarely used for the reason that effects of noise appear as changes of amplitude and, as a result, the accuracy of such a system would be affected by noise on the telegraph circuit. A system using variable-length pulses requires a minimum band width due to its low signaling speed and consequently is relatively slower in response than a system where the pulse rate varies with variations in the measured quantity. In many applications, speed of response is not important and for this reason variable-length pulses are satisfactory, making it possible to use a minimum band width for the telemetering channel. Where rapid response is essential a varying-pulse-rate system is required with its attendant increased band width. For physical telegraph, where only one indication is transmitted, band width is not particularly important, but where it is desired to transmit many simultaneous indications by means of carrier, conservation of band width becomes an important factor.

It is hoped that the preceding discussion will serve to provide basic concepts of the principles of telemetering and the applications of the communications art to the transmission of telemetering information. No attempt has been made to describe any particular system in detail or to weigh the economic factors involved. Consideration of these factors should come logically after the principles involved are understood and will vary greatly with circuit length, the number of quantities that it is desired to telemeter and whether or not existing communication circuits are available. Each telemetering system requires individual study to determine the method best suited for the application, and the information outlined above should be of assistance in the over-all consideration.

Individual Reel Control

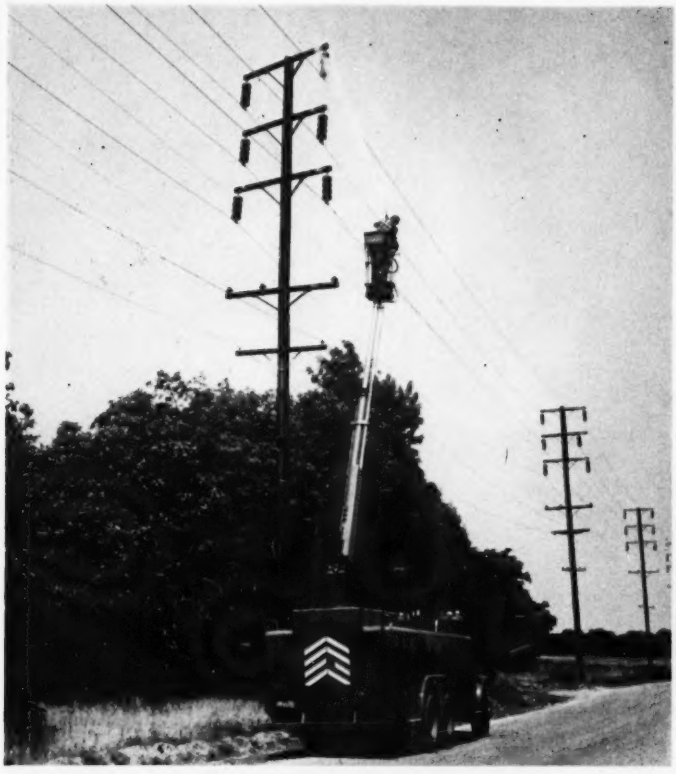
Features of a new power-operated take-up reel designed by the San Diego Gas & Electric Co., here shown, are flexible control over individual reels and ease of changing reels. The unit is mounted on a single-axle, low-bed semitrailer.

The power unit is a 6-cylinder, 126-cu-in. displacement, gasoline engine with clutch and four-speed forward and one reverse transmission connected with a ratio of 1-to-1 to a V-belt pulley driving a common shaft at ¾-to-1 ratio.

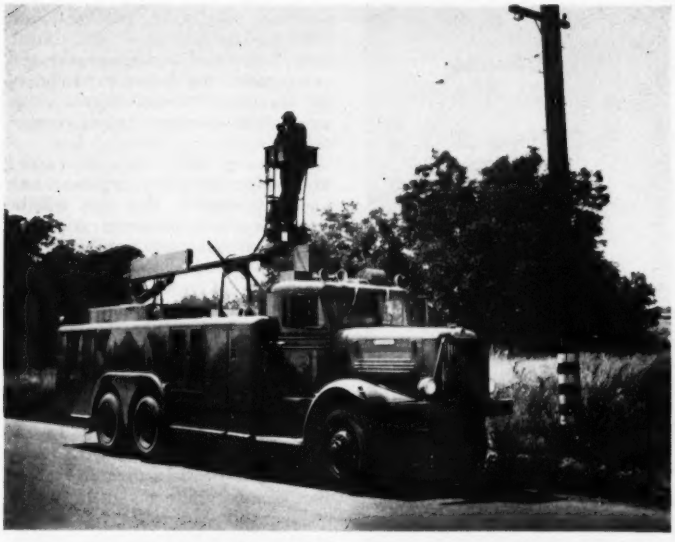
Line friction clutches provide controlled take-off for each of the four 30-to-1 ratio worm-gear reducers by dog clutches for easy removal to change to rope reels or standard wooden wire reels. A brake is provided at the friction clutch take-off of each reel that is automatically applied when the clutch is released. Variable reel speeds from 1½ to 19 rpm are obtained.

All controls with the exception of the dog clutches at the reel mandrils are extended to a centrally operated point. Together with walkie-talkie communication for sagging, the new equipment has effected large economies in transmission line work.

Insulator Washing



Latest insulator washing equipment developed by Southern California Edison Co. is this Industrial Monkey. An average day's progress is 110 poles of double-circuit 69-kv line



Operator-controlled hydraulic boom on tank-pump truck is shown in traveling position

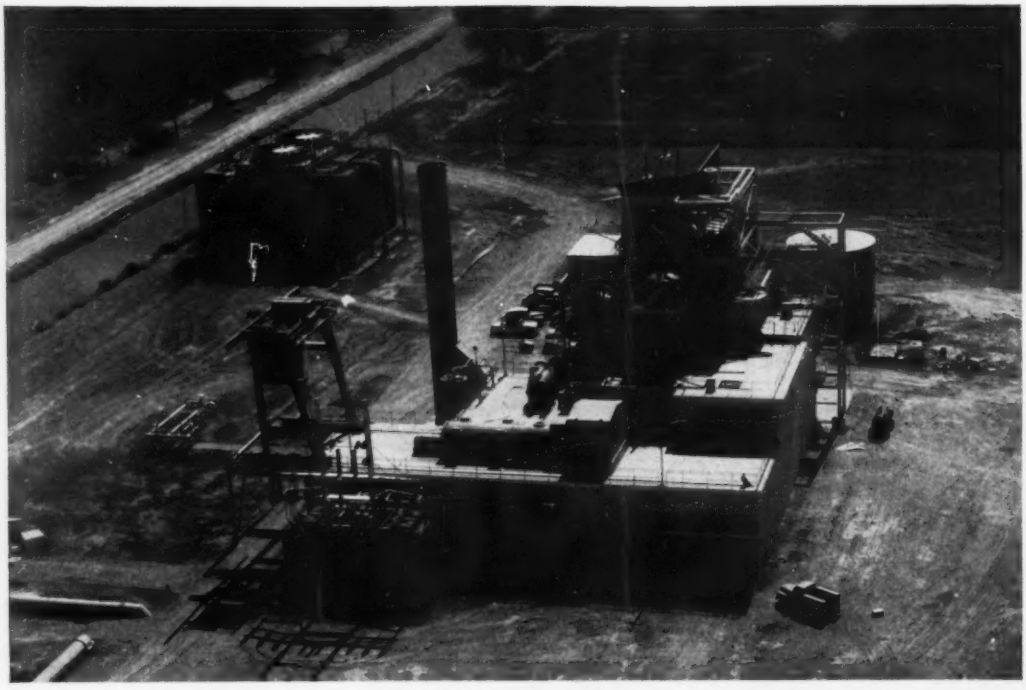
New records for the number of insulators washed in a day are being made by the Southern California Edison Co. with the piece of equipment here shown. Of the several rigs used by the company for washing insulators on energized lines this latest outfit, consisting of an Industrial Monkey mounted on an Oshkosh truck chassis, is performing most efficiently. An average day's progress is 110 poles of double-circuit 69-kv line and one 11-kv circuit.

The Industrial Monkey, made by the Don Will Co. of Portland, consists of a telescoping hydraulically operated boom that may be mounted on any type of chassis. The insulated operator's cage is so arranged that it remains level at all positions of the boom. Foot controls, two of which may be operated at the same time, enable the operator to raise, lower and swing the boom and position himself rapidly. The basket extends to 37 ft in height, which means that lines on 70-ft poles may be reached.

A complete battery-powered intercom system permits conversation between the driver and hoseman. An additional telephone jack at the base of the Industrial Monkey is provided for a supervisor. In addition, a Powers "Cabscope" is installed in the roof over the driver's head to permit him to watch the hoseman.

High-pressure water is supplied by a Bean Triplex reciprocating high-pressure pump driven by a 6-cylinder 50-hp Chrysler Industrial 7 auxiliary engine. The pump will produce 50 gpm at 800 psi with 1,500 rpm on the input shaft. The nozzle used on the pistol-grip water gun for directing the high-pressure water stream has a bore of ¼ in. and is rifled or splined to keep the water from swirling and to hold it in a solid stream for a distance of 15 ft from the nozzle. A 1,500-gal tank provides water storage between trips of the tank truck to a source of water supply. Usually two trips a day are required.

Superintendent of Transmission C. W. Sanders, who drew up the specifications for the new equipment, is well pleased with results.



Climatic condition in the Salt River Power District's service area was the governing factor in determining the extent to which . . .

Outdoor Design Was Used at Kyrene

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Chief Engineer
Salt River Power District

E. J. Lauerman
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Salt River Power District

I. R. Caraco
Project Engineer
Bechtel Corp.

Local climate is the prime factor determining the extent to which enclosures on steam plants can be minimized. Kyrene, a new outdoor steam plant of the Salt River Power District, located 12 miles southeast of Phoenix in the great southwest desert, has been designed to best meet the local weather requirements. The mild climate permitted the selection of an outdoor boiler and turbogenerator unit. An inexpensive lightweight pumice block enclosure below turbine deck has been provided to house most of the auxiliaries and furnish space for shops and maintenance of equipment. An enclosed control room and station office is located on the operating deck.

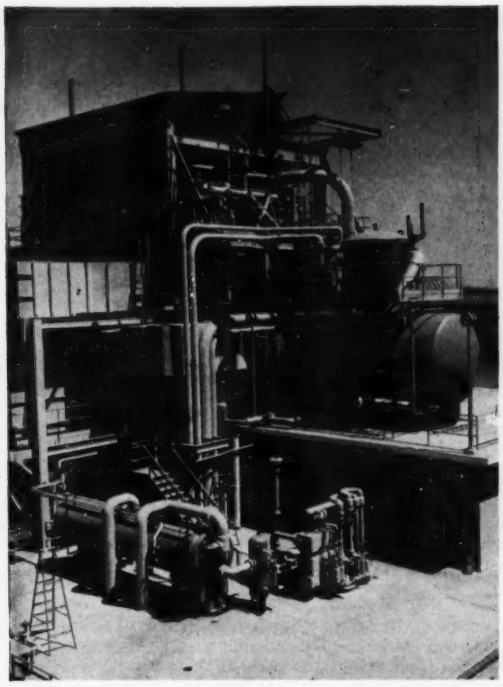
The Kyrene design compares favorably with other new plants listed in a recently published survey, containing most of the popular features and attributes covered by the review and many innovations of its own. Bechtel Corp., retained by the district, is responsible for the design and construction of the plant. All design features were worked out in close collaboration with the engineering and operating departments of the power district.

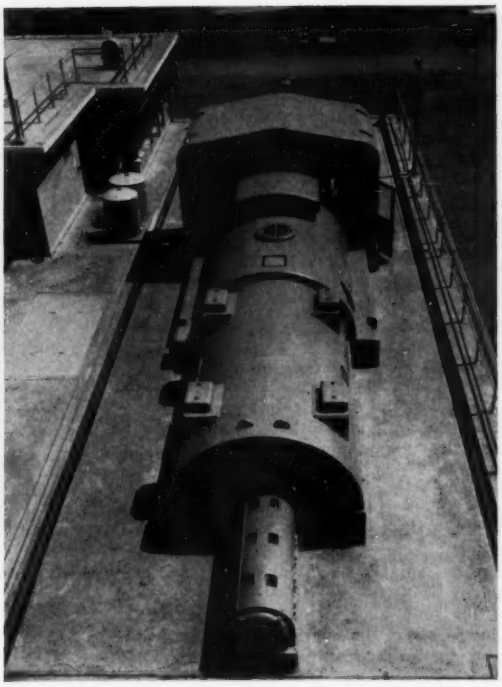
Unit Design

The unit system of design is carried throughout with the single outdoor boiler and turbogenerator and encompasses the future extension of the plant to a two-unit mirror image installation without cross connections.

Operators have been minimized to three per shift for the present unit and it is possible that this will be the ultimate requirement for both units. This was made possible by the extremely compact arrangement and automatic design features. Automatic features include centralized control, automatic feedwater and combustion control, and highly automatic electrically driven station auxiliaries.

The Kyrene site was chosen from a study made of four possible locations in the Salt River Valley. It was determined to be the most economical location after an evaluation based on the major factors of condenser cooling water, fuel supply, accessibility to railroad, power wheeling and increased breaker interrupt-





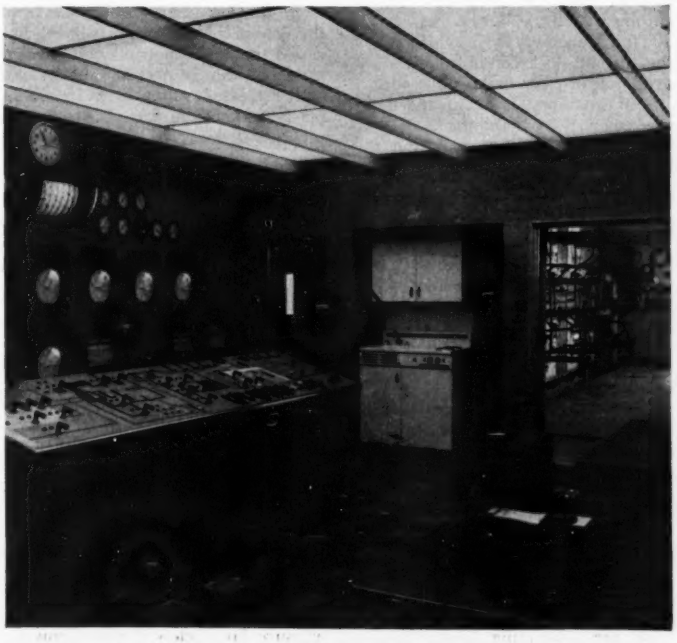
Outdoor boiler (left) and outdoor turbine-generator at Kyrene plant. Pumice block enclosure below houses most auxiliaries and shops

ing capacity. The plant site abuts on the Western Canal, a major canal splitting into three minor canals flowing to the west from the site. The Western Canal stops flowing a few days in the year and this occurs simultaneously with low load demand, thus minimizing cooling tower capacity and operation.

In addition to being modern, simple and compact in design, care has been taken to make Kyrene attractive and colorful in appearance. The exterior walls are buff and the machinery light green. Interior walls, where painting is necessary, are tastefully decorated in light colors. A simple flagstone front to the diminutive and comfortable reception room provides a pleasing entrance to the visitor.

Steam Generating Unit

The Combustion-Superheater steam generator is designed to produce 350,000 lb of steam per hour continuously, with a maximum capability output of 375,000 lb per hour for a four-hour peak, at 925 psig and 905 F total temperature. It has a water-cooled furnace; a two-drum bent-tube boiler with a two-element superheater; a regenerative



Control room is air conditioned, electrically heated, has soundproofed walls, a luminous lighted antiglare ceiling, asphaltic tile floors and an adjoining pullman kitchen

air preheater; combination fuel burners that will operate with either oil or gas; and automatic combustion, feedwater and superheat control. A constant-speed motor-driven forced-draft fan with vanes supplies air to the burners and a constant-speed motor-driven induced-draft fan with louvers delivers the flue gases to the self-supporting steel stack. Both fans are located at ground level. The plant is designed for burning natural gas automatically, or fuel oil manually, and can be converted to burn coal or lignite if ever economy should dictate so.

Turbine-Generator Unit

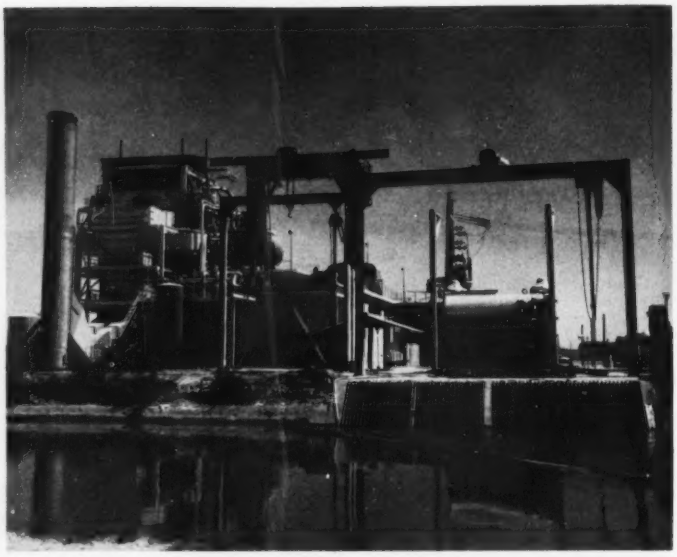
The General Electric turbine-generator is an AIEE-ASME preferred standard unit with a name plate capacity of 30,000/33,000 kw and nominal throttle conditions of 850 psig and 900 F. With the throttle pressure increased 5% and the liberal design tolerances used, it is expected that a maximum gross capacity of 37,000 kw will be obtained.

The only valve in the main steam line between the superheater outlet and the turbine valve chest is the hydraulically operated stop valve supplied by the turbine manufacturer. The turbogenerator is designed for outdoor operation with a walk-in housing over the head end of the turbine. Gantry crane service of 30 ton capacity is provided along the turbine deck for installation and overhaul of the main unit with a 10-ton auxiliary hook arranged for convenience in handling lifts outboard of the crane runway and turbine foundation.

Condenser

The turbine exhausts to an Ingersoll-Rand 27,500 sq ft two-pass condenser with vertically divided water box with a normal circulating water flow of 25,800 gpm. For the short period each year when there will be a deficiency of cooling water in the Kyrene canal, the water will be recirculated over the Marley cooling tower. Condensate from the condenser is handled by two full capacity motor-driven condensate pumps discharging through the air ejector and first stage of regenerative feed heating to the deaerating feedwater heater.

Two Pacific Pump Co. full capacity motor-driven double-casing main feed pumps will take their suction from the deaerating heater storage section and discharge through three Braun high-pressure heaters to the boiler. Steam for the feedwater heaters is extracted from five turbine bleed points and heats the feedwater to a final temperature of 438 F at 37,000-kw load. Drains from the highest pressure heater are cascaded from one heater to the next, and finally to the deaerator. Drains from the low-pressure heater will be cascaded to the main condenser. Make-up feedwater is obtained by evaporating treated water in a 15,000-lb-per-hour Griscom-Russell evaporator incorporated in the feedwater heating cycle, the evaporated vapor make-up is delivered directly to the deaerator as steam.



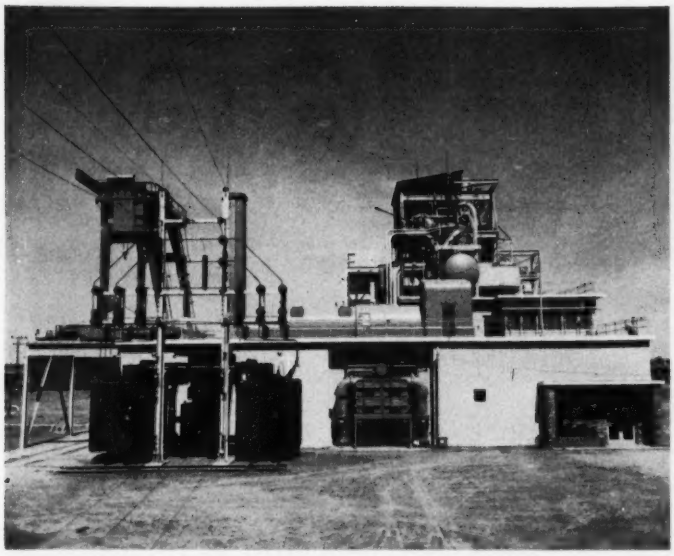
With deficiency of cooling water in canal water will be recirculated over cooling tower

The high-pressure closed heaters are of the vertical type with the channel at the bottom. This type of construction allows the water nozzles to be welded and tube maintenance to be accomplished in place after removing the shell with the auxiliary crane hook through a hatch in the operating deck. The Cochrane deaerating heater is of the vertical spray type with a total of 10 minutes water storage at full load. The normal steam supply for this heater is from the fourth extraction point with provision for automatic supply from the third extraction point when the heater pressure decreases to 4 psig and for the admission of live steam from the auxiliary steam system when the pressure falls below 2 psig. Thus effective deaeration is obtained over the full load range of the plant.

Piping has been designed to make the maximum use of welded construction. In general, flanged joints are provided only where necessary for removing machinery or equipment. Motor-operated valves are provided where necessary for convenience and control. All valves are readily accessible for manual operation and most are located at the 10-ft level and adjoining steel-grated walkways.

The 69-kv electrical and the mechanical control boards are located in the control room at the turbogenerator level. Mechanical controls and instruments are centralized in the control room on a schematic picture-type console board using Bailey Mini-Line instruments. Recording meters and indicating gages are mounted on a vertical panel directly behind the console. Pressure-control relays are mounted behind the vertical board on the wall with convenient access to all tubing. The mechanical boards are so arranged that one operator can bring the turbine up to load and change load without leaving his initial position. In addition, he is approximately 25 ft from the burner front.

The 69-kv electrical control bench board is at right angles to the console board and diametrically opposite the double glass doors leading to the firing aisle. All 69-kv switchyard breakers and 2,400-v auxiliary breakers are controlled



Generator is directly connected to main and auxiliary transformers by isolated phase bus

and indicated at this point. All control wiring is carried in conduit and metal trays to the cable spreading and relay board room, which is located directly below the control room. The metal trays and conduits in most instances are run slightly above the 10-ft level and are readily accessible from the steel-grated walkways for maintenance purposes.

The control room is air conditioned by refrigeration and is electrically heated. And in addition, it has soundproofed walls, luminescent antiglare ceiling and asphaltic tile floors, no windows except in firing aisle, pullman kitchen and adjoining toilet facilities, making for the maximum operator comfort and efficiency. The station chief's office adjoining the control room is also air conditioned and soundproofed. Two doors exiting to the control room and firing aisle place him within a few steps of the critical control points in emergencies. To assure that a minimum of the operator's time and attention is consumed in detail, an extensive annunciator and alarm equipment has been installed to supervise constantly all electrical and mechanical equipment.

The Bailey three-element feedwater regulation system operates to balance feedwater flow against steam flow and to maintain a drum water level that is high at full load and low at low loads. The Bailey combustion control system operates to control the fuel firing rate to the requirements of the rate of steam generation, to maintain the fuel-air ratio necessary for complete combustion, to maintain a constant steam pressure midway between the turbine and the superheater outlet with a rising characteristic that produces a 5% overpressure at full load and overloads and to maintain the correct draft in the furnace.

Make-up and draw-off of distilled water from storage tanks are determined by the deaerator water level, which is maintained between limits by level controllers. Mason-Neilan Level-trol valves for steam drips from closed feedwater heaters and many other automatic controllers reduce the operation personnel to a minimum.

Electrical System

The generating unit is a General Electric Co. outdoor 12,500-v, 3-phase, 60-cycle, 35,294/40,588-kva, 0.5/15-psig hydrogen-cooled machine. It is connected directly to the main and auxiliary transformer by isolated phase bus through flexible joints provided for earthquake protection. The main transformer ties into the 69-kv switchyard generator conductors. The Kyrene switchyard is a major tie point on the Salt River system and provides switching for the generator, station stand-by transformers, three system tie feeders and the transfer bus.

The generator has a direct connected 250-v exciter and a separately driven amplidyne voltage regulator. Provision has been made for the future use of a spare exciter, although none is contemplated when the second unit is added.

The 2,300-v boiler feed pump and draft fan motors are connected directly to the 3,000-kva station auxiliary bank. A stand-by 6,000-kva bank sufficient for both units 1 and 2 has been installed initially and an automatic transfer provided in case of failure of the normal auxiliary supply.

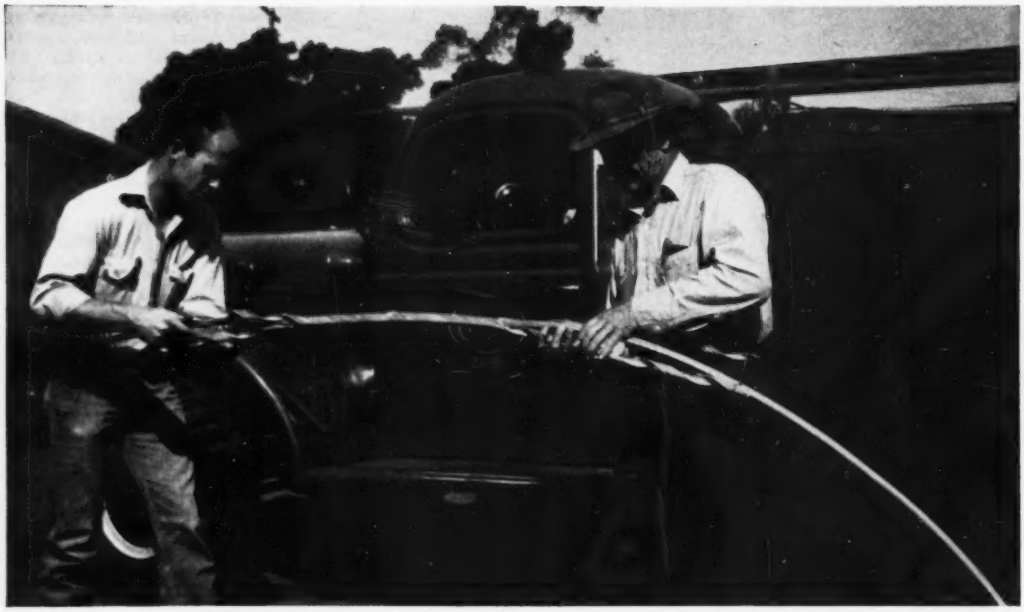
The remaining auxiliary motors are served from the 480-v system consisting of a 1,000-kva air-cooled transformer feeding a metal-enclosed 480-v air circuit breaker board and in turn a 480-v cabinetrol switchgear assembly.

Incandescent lighting is generally used throughout the plant, except for the reception room, offices and control rooms, which have high-level fluorescent lighting. Emergency d-c lights are automatically provided in case of failure of the normal lights. The normal lights are supplied from dry-type transformer regulator units, holding lamp voltage within 1% limits

The tie lines to Kyrene are all protected by means of phase comparison relaying over carrier current channels and backed up with directional overcurrent relays both phase and ground. The electrical equipment in the plant is fully protected by relays and coordinated in accordance with accepted practice. The generator, main transformers and auxiliary transformers are all protected with differential relays. The line, transformers and generator relays are all mounted on the relay board in the cable spreading room.

The main annunciator system consists of the electrical and mechanical annunciator relay cabinets located in the cable spreading room and the line, generator, auxiliary power, electrical, turbine and boiler annunciator groups on the electrical and mechanical control boards in the control room. A common-talk, selective-ring telephone system with code call equipment provides communication within the power plant and to the outdoor facilities.

Summarizing briefly, Kyrene represents a major step of progress in power plant layout. It is worthy of consideration by the power industry in general, because of its compactness with optimum accessibility to all wiring and piping, and ample space for maintenance of equipment.



Applying preformed-rod splice to light steel core conductor. Two men can make a preformed joint in five minutes when using . . .

ACSR for Subtransmission Lines

Light steel core and preformed-rod splices offer attractive economies. Rational approach to accessory problem needed

Jordan Lummis

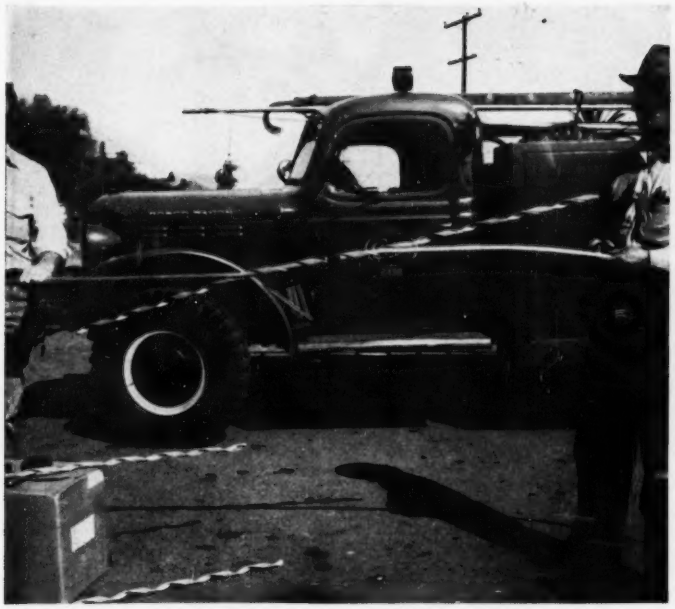
Transmission Engineer
Southern California Edison Co.

Because of the critical shortage of copper the use of aluminum conductors for transmission lines has become almost mandatory. As a matter of fact, aluminum conductor has been economical under most conditions for a number of years. The only apparent reason that it has not been used more in the past is to be found in the inherent conservatism of utility engineers. The Southern California Edison Co. has used aluminum conductor steel reinforced for major transmission lines for at least 40 years and has used all-aluminum on some of its subtransmission nearly as long. In the main it has been fully as successful as other conductor materials.

It would appear that the reluctance of engineers to increase their use of aluminum conductors stems from the fact that aluminum problems have received a large amount of publicity. The troubles arising from vibration, creep and connection have been widely publicized but the same problems with other types of conductor have been taken as a normal hazard of the business. Nevertheless, everyone who has been in the industry 30 years or more knows that the problem of economically connecting any conductor has never been satisfactorily solved, from the days of the old served splice, through the twisted sleeve era, down to the present chuck-type joint.

In cases where mild climate has permitted high normal tensions, where the designer has used high normal tension to squeeze out the last drop of economy, or where the relations of linear density, diameter and normal tension have been propitious, aeolian vibration has been just as serious a

If one persists in ignoring the inherent characteristics of the materials and tries to use, on aluminum, fittings that were designed for other conductors, trouble will not be far in the offing. On the other hand, if a small proportion of the savings generally realized by substituting aluminum conductor is invested in adequate fittings and good line design, excellent service will result.—The Author.



Conductor is coated with petrolatum and ends taped before applying set of splice rods

factor with other conductors as with ACSR. It has not been the custom to tension other conductors to as high a percentage of their elastic limit as has been customary with aluminum; but where they have been so installed creep has been an important factor to consider, or should have been considered, in their design.

Light Steel ACSR

Southern California Edison's practice in the past has been to use copper conductors on all its subtransmission lines. These lines are 66-kv on wood poles. The spans are generally short, 200 to 300 ft, for reasons other than those dictated by economies of span length. The conductor is usually 4/0 copper with two transmission circuits on top, several distribution circuits below and possibly telephone circuits below the distribution. The savings from fewer poles usually attributable to ACSR were therefore not available and, prior to the wartime economy, the small saving in conductor cost alone did not justify the cost of setting up new standards, purchasing new tools and stocking additional fittings.

Coincident with the scarcity of copper and the consequent spread of price between it and aluminum, Aluminum Co. of America developed the light steel conductors. For Edison purposes, these are an ideal substitute for copper because they combine most of the advantages of all-aluminum with those of conventional ACSR. They have a minimum of steel core; they are light and small in diameter, yet there is sufficient steel to support the conductor if the aluminum envelope burns off. In the 336,400-cm (4/0 Cu equiv) size, light steel conductor saves 26% in weight, 27% in factory cost and 8% in diameter as compared with conventional ACSR.

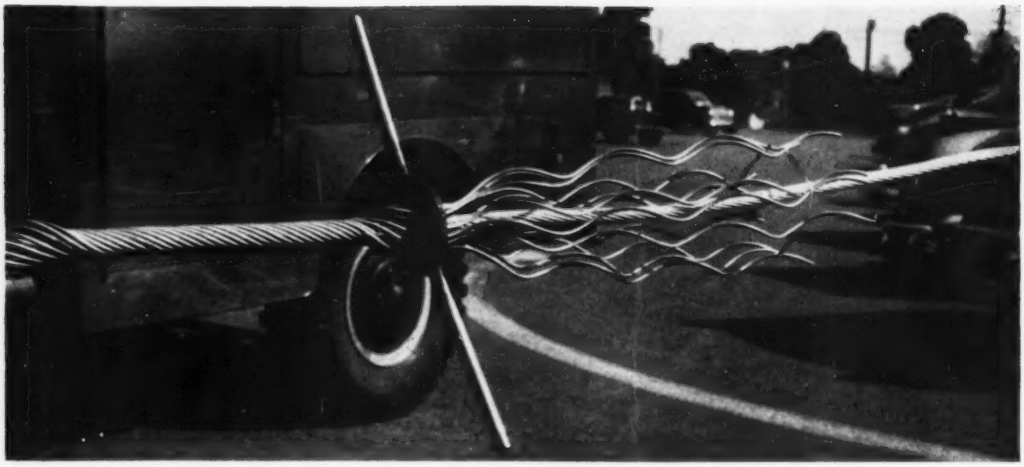
The 336,400-cm light steel conductor has 18 strands of aluminum over one of steel. The nominal ultimate strength of the cable is 8,950 lb while the nominal ultimate strength of the aluminum envelope is 6,600 lb. If this conductor is tensioned to the same sag now used for equivalent copper, the maximum tension will be about 1,500 lb or 2,900 lb, California light or heavy loading, respectively. This is close enough to the maximum tension of the copper equivalent so that the same guying can be used.

It will be noted that the factor of safety in light loading exceeds four and in heavy loading exceeds two, even if no reliance is placed on the steel core. There is no need, therefore, for splicing the core; this greatly simplifies the joining operation. Requirements for an economical and effective joint, more or less in the order of decreasing importance, are: (1) Sufficient contact length and contact pressure for continued conductivity, (2) adequate strength, (3) similarity of metals, both in the electromotive series and rate of expansion, (4) ease of installation, (5) minimum number of special tools for application, (6) certainty of proper installation with minimum skill, (7) long, favorable service experience and (8) adaptability to hot work.

Twisted joints are ruled out by (1), (2) and (8). Satisfactory chuck-type connectors have not been developed for multilayered aluminum conductors and in any case would probably be ruled out by (6). Compressed joints have been the standard of the industry for many years and have served their purpose admirably. Substantial improvements too have recently been made, nevertheless these connectors still do not fully measure up to the requirements of (4), (5), (6) and (8). Preformed rods have been successfully used for a number of years by Edison to repair damaged ground wire and they appear to satisfy all requirements for joining light steel aluminum conductor except (7) and possibly (8).

As the only available substitute for long experience, a rather extensive series of tests has been conducted on preformed-rod splices. A set of rods for a joint in 336,400-cm ACSR 18x1 consists of 13 aluminum alloy wires (61S-T91) preformed in helices 70 in. long. Each rod has a diameter of 0.182 in. and the pitch of the helix is 5¾ in., with an inside diameter about 80% of the conductor diameter. The contact surfaces of the rods are coated with synthetic rubber cement to which No. 80 aluminum oxide grit adheres. Each set is preassembled in subsets of 4, 4 and 5 to facilitate installation. These joints were applied to conductor liberally coated with neutral petroleum grease.

During testing it was soon found that some tension was necessary for full conductivity. Joints tested prior to any tensioning or working showed only about 102% of the conductivity of an equivalent length of cable. Typically, about 100-lb tension raised the conductivity to 130%, at stringing tension the conductivity rose to better than 140% and did not fall below 130% on return to no tension. Salt-spray tests, 200 hours continuous in a 600-hour period, showed increased conductivity, if anything, and no corrosion was detectable. Typical heat-cycling tests at 600 amp a-c in still air at 72° ambient gave 200 F temperature at the joint as against 260 F in the conductor.



Tool for twisting armor rods on light steel ACSR is one of those being developed for hot work. Rubber bands prevent flare of ends

Typical of tension tests on 30-ft specimens is a break in the aluminum just inside one of the rods at 112% of the normal ultimate strength of the aluminum strands or 83% of the nominal ultimate strength of the composite cable. The increase in 70-in. gage length across the splice at 100% ultimate of aluminum was about 0.6 in. and the twist across the splice about 130°. Twist across the joint was about the same in a 220-ft span. Typical too is an increase in strength after such working as pounding, vibrating, flexing or passing across sag blocks. When the grit was stripped off the rods, the joint slipped at 94% nominal ultimate of the aluminum, held to 45% before slipping again, then held at 30% before slipping, finally completely failing at 15% ultimate.

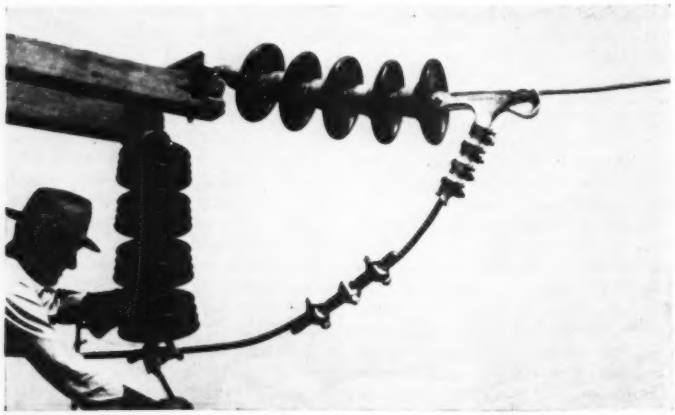
Time for application of the joint under laboratory conditions was found to be about five minutes for two men. This includes time for seizing and cutting the conductor, scrubbing it under petrolatum with a wire brush, applying the rods and seating them with a hammer. Time required will probably be shortened, even under field conditions, as the skill of the splicer improves with practice.

Performance of the joints under test was so uniform, the results so consistent and the advantages so obvious that preformed rods will be used extensively for splicing and repairs. It is realized that the real test of a joint is only to be found in long experience but, as in the case where a more radical change in splicing methods, the change from twisted sleeves to chuck-type splices, was made, it is believed that the advantages to be gained are worth the risk. Furthermore, should electrical or mechanical faults later develop in these joints simple methods of correction are available. Development of tools for hot work are under way and at this time there appears to be no unsurmountable obstacle to this form of application.

The remaining hardware for light steel conductor is also aluminum, not only to eliminate the effects of cold-flow and temperature and to reduce corrosion but also for reasons of economy. The suspension clamps will be the one-piece type similar to those standard with Edison for years.

The jumper connectors, which will be used also for jumper taps, will be the opposed-bolt clamps similar to those previously developed for copper but modified for lower pressure on aluminum. The dead-end clamps are the spiral-seat snub-type with tensioning eyes. The first two fittings are composed entirely of aluminum alloy while the only ferrous parts on the dead-end clamp are the U-bolts.

Utility men who are accustomed to reinforced aluminum conductor are unable to see that the industry faces a crisis merely because the material is unfamiliar to some constrained users. Naturally, if one persists in ignoring the inherent characteristics of the materials and tries to use, on aluminum, fittings that were designed for other conductors, trouble will not be far in the offing. On the other hand, if a small proportion of the savings generally realized by substituting aluminum conductor is invested in adequate fittings and good line design, excellent service will result.



All conductor hardware is aluminum similar to that used by Edison company for years

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Building took a big spurt in northern California when the long carpenters' strike ended. Building permits jumped as much as four times. Manpower became hard to find. Search for materials became frantic as the steel strike put a blanket on steel allotments. However, in Los Angeles the permits ran about the same. Other parts of the West, as big projects wound up, found building slow, men on the bench, competition for existing jobs very sharp-pencilled. For the whole year so far construction is running a little behind a year ago except in some "defense" areas. The outlook, many predict, is that totals will run high the rest of the year, but look out after June next year when many things have caught up. Until elections are over everything will be pumped in to make the boasted prosperity seem true.

Building buzzing

Las Vegas, Nev., and Twenty-nine Palms, Calif., have been designated as critical defense housing areas, with relaxed controls to aid more house building. Both include nearby areas because of heavy influx of military personnel and defense workers.

Need more houses

But there's trouble in the electric heating paradise of Las Vegas. After a no-holds-barred battle over serving electric heating, between contractors, dealers and manufacturers in one corner and Southern Nevada Power Co. in the other, claiming "no juice available," the Nevada Public Utility Commission issued orders to require (1) load limiting or regulating devices, (2) thermostats on all 1,500-w or over heaters, (3) maximum kw for heating purposes and (4) controlled water heaters.

Controlled heat

But the FHA ruled, through Greg McCullough, supervising architect, Reno, that government financing would be denied as long as these rules exist, claiming this would not provide adequate heating. When contractors, utility, chamber of commerce and house-hungry public went into battle once more, McCullough agreed to hear evidence, based on Tennessee and Florida figures, if they could prove Las Vegas FHA homes would have adequate heat. Meanwhile, no financing of the $10 million of new homes awaiting an O.K.

. . . and financing

Meanwhile J. Lyman Earl, engineer, has been appointed to head a special space heating department by Southern Nevada Power Co., to consult with electrical and building contractors on application of the Rule 17 of Nevada PUC. He lives in Boulder City, is a University of Nevada graduate.

To take heat off

Price of copper wire has been subject to confusion because of both the adjustment of import and domestic prices to a new combined price increase granted the copper mills. Whether the distributor could pass on the increase to him with his margin was in doubt but has been cleared by CPR 67 Amendment 10 of July 21. The order applies to all supply items carried by wholesalers. If a manufacturer's discounts differ from his base period, the wholesaler calculates his ceiling prices on the basis of his historical markup.

Wire prices

Copper was loosened from many controls in July but steel, because of the long strike, will be a long time getting back into production on consumer goods. Fortunately there were pretty good inventories of conduit and steel tubing and these may last through the production lag. Reimposed controls under CMP were made by DPA and NPA but those having steel on hand were permitted to use it. The military and AEC will get the first steel produced. No change is to be made in the pattern of allocations already set up for the second, third and fourth quarters. Users may be delayed in getting their allotments but will not lose their place in line. This will save the confusion of redoing the whole program. Copper and aluminum users will get their allotments as scheduled and may inventory them. Meanwhile CMP 5 has been opened up substantially for maintenance, repair and operating supplies.

More copper

Wire control eased

So were CMP Reg. 6 and M-100 relaxed somewhat. CMP-6 relates to construction of industrial plants, factories or facilities and also to recreational, entertainment and amusement construction. Self-authorization limits on steel, copper and aluminum were raised. M-100, the residential construction order, was amended to allow up to 50 lb of copper per dwelling unit using steel water pipe, 175 lb of copper where copper water piping is used. There is now enough to do an adequate job.

Price retreat

OPS was busy decontrolling and cutting its staff in accordance with the limited renewal of tenure of controls to next April and limited powers granted by Congress. OPS now exempts one-man shops who employ nobody but themselves from price control, either under CPR 93 or 34.

Voltage raised

Use of 277-v fluorescent lighting is now permitted by the National Electrical Code, as a new interim amendment No. 96, dated June 9, announced by the Electrical Section of NFPA sets forth. It adds a subparagraph to Article 210—Branch Circuits, Section 2113—Voltage. After the sentence numbered (1) is inserted another numbered (1-a): "In industrial establishments, office buildings, large schools and stores, the voltage of branch circuits which supply only the ballasts for electric discharge lamps in permanently installed fixtures mounted not less than eight feet from the floor, which do not have manual switch control as an integral part of the fixture, may exceed 150 v to ground, but shall not exceed 300 v to ground." (See article by Harold Gerber in the May 1952 Electrical West, page 90.)

When is "stable"?

Wage increases having been granted in virtually a complete round of inflation in the electrical construction field and thus seemingly stabilized at a new high, already the ferment for still more was brewing. Oakland's Local 595 IBEW was asking another 12c an hour for journeymen, offered to compromise on 6c rather than go to the Council on Industrial Relations, but contractors said it would unstabilize the whole state again. What San Francisco might do is the question. Local 6 has asked for labor committee meetings, without saying what it is going to ask.

In a new field

Copperweld wire has been suggested as a grounding and bonding bare wire instead of aluminum because of its copper covering, ductility, and strength (having a steel core) as equipment grounding wire is often subject to mechanical injury or corrosive atmospheres. Efforts to have it tested, approved and listed by Underwriters' Laboratories for such purpose may soon be made.

Aluminum advice

Thomas & Betts Co. has combined in a package, available from its representatives, a number of data sheets and an article by one of its engineers to inform and instruct contractors and wiremen on how to make satisfactory connections with aluminum, chiefly in the larger size conductors. It is titled "Making Good With Aluminum."

Bus duct switching

To further clarify the change in the California State Electrical Safety Orders relating to acceptance of fused switches on bus duct, here is the exact wording. It is an exception under Article 10, Switches and Circuit Breakers, Section 2412 g—Readily and Safely Accessible. "Exception: On bus duct installations fused switches and circuit breakers may be located at the same level as the bus duct provided such fused switches and circuit breakers are of the interlock type (door of device cannot be opened until the device is in the 'off' position) and no live parts are exposed when the door is open. Suitable means shall be provided to operate the handle of the device from the floor and a suitable fixed or portable platform shall be used for servicing such equipment." This new rule is available from the state department of printing in reprints of all the changed sections for inclusion in older books. The new printing of the Safety Orders contains all changes, the old edition being sold out.

Panels numbered

Deadfront panelboards made in sections and assembled at the job have long worried inspectors when some sections bore UL labels, others didn't. So Underwriters' Laboratories asked inspector opinion. The Northern California Chapter IAEI recommended that "each label section of panelboard shall have a name plate on the front exterior that shall contain ampere rating of the bus bars contained therein and that sections be numbered and that the main panel indicate the summation of the total number of panels approved." Such information would guide inspectors in their own acceptance of the board.

Explosive issue

Powder guns or explosive actuated tools for driving studs into wood, concrete or even steel for fastenings have been disputed tools on the grounds of safety although suspicion is that labor saving is really what unions object to. Improved designs of powder guns with extra safeguards have made them all but foolproof. Oregon's Industrial Accident Commission came to a much more sensible solution to the controversy than did California's. After several hearings at which representatives of labor, contractors and manufacturers presented views and facts, the commission issued "Safety Standards for Explosive Actuated Tools" as a supplement to its basic safety code.

One license enough

City license fees and bonds in California were again declared void by a District Court of Appeals in Los Angeles which threw out the city's $100 "permit service fee" and requirement for a $1,000 surety bond for electrical installation. Judge Vallee declared these to be in conflict with the state contractors license law. He said it was proper to require an individual permit fee if it was commensurate with the expense of inspection. R. W. Agnew brought the action.

Code appointment

Harry V. Dobson, city electrical inspector, Santa Barbara, has been appointed to code making panel 14 by the National Electrical Code Committee of NFPA. A. M. Miller, Pacific Gas and Electric, was dropped from panel 15, and V. C. Moulton, now in Albuquerque, from 10. The Code Committee also set up a new technical subcommittee on electrically operated production machinery—the special rules pertaining to metal working tools not being considered inclusive enough.

Held over

S 2907, sponsored by the mechanical specialty contracting industries, among which is National Electrical Contractors Assn., was diverted at the last of Congress before it adjourned and must wait for the 83rd Congress in January. The liaison committee of the specialty contractors met in Washington July 29 to plan continued joint activity to get the bill passed. Called the Federal Construction Contract Act, it aims to stop bid shopping by general contractors.

Aluminum next

When Kaiser Aluminum applied to OPS for a price increase the other big manufacturers of it were eager for one also, so aluminum wire will probably reflect any increases granted as it did with copper, thus reducing the price difference between the two metals. While there has been lots of talk about use of aluminum wire, except where it has been specified, the contractors aren't buying much of it. Neither contractors, wiremen nor inspectors are convinced yet that connections are satisfactory to wiring devices or to copper. Use of aluminum for ground and bond wire for equipment grounds where connection is made to copper water pipe was debated at a recent inspector meeting.

Uncertain control

Just what was left of WSB and its branch Construction Industry Stabilizing Commission under the watered down Defense Production Act was not yet clear, although there was reason to think it would continue to pass on requested wage increases on a recommendation basis. Cases filed after June 27 may have to wait until new policies are determined by the new WSB, not yet filled by appointment. For one thing, small businesses employing less than eight men are exempted from wage control. How this affects association-union agreements is not clear as yet. Professional engineers are also exempted.

Helpers help

When representatives of various chapters of NECA in District 6 met with Oscar Harbak, IBEW vice-president for the same area, to discuss the complaints made by contractors at the District 6 meeting at Santa Barbara, several problems were cleared up. The San Francisco meeting was promised help in classifying necessary helpers doing laborer's work so that electrical contractors could be competitive with general dirt contractors in underground and street lighting work.

All pay the 1%

Also learned was that IBEW is making a determined drive to get employers of electrical workers on maintenance and motor shop men to pay the 1% of labor pay roll that contractors pay into the pension fund. It was likewise inferred that IBEW might go back into the joint jurisdictional council of AFL unions from which it withdrew recently.

Honored

Joe Santora, electrical contractor of San Jose, was recently elected city councilman of that city.

A real loss

Arthur L. Abbott, author of the National Electrical Code Handbook, died July 26, in his 80th year. Since 1931 he has been on the staff of National Electrical Manufacturers Assn. on code work. Before that he was technical director of the Electragists, as NECA was known at that time. Before that he was an electrical contracting engineer. He prepared the National Electrical Code Handbook as an aid to understanding the intent and meaning of the code, and during the years revised it as new editions of the code were issued. He also authored an electrical contractors' estimating manual and wrote many articles. He had been to inspectors meetings in the West often.

Into the electronic

Ets-Hokin & Galvan, electrical contracting chain in California, has become distributor for a complete line of electronic parts and equipment for radio and TV stations, repairmen and industrials, handling G-E, Amperex, Centralab, Merit, Jensen, Lowell, Webster-Electric lines and Onan stand-by generators. Charles Dickinson heads the new department, with headquarters in the San Francisco office.

Pioneer honored

R. H. Conrad, pioneer electrical motor shop operator and contractor of Oakland, was presented a 50-year certificate of honor by the National Industrial Service Assn. Presentation was made at the last meeting of the San Francisco Bay Area Chapter.

Wheels in wheels

Supply lines handled by General Electric Supply Corp. now are handled by General Electric Supply Co. as the company becomes General Electric Distributing Corp. The supply company is a division of the latter, which is a subsidiary of General Electric Co.

New veep

Leonard Hobbs, vice-president in charge of sales of Smoot-Holman Co., lighting fixture makers, is to be regional vice-president of the Illuminating Engineering Society, South Pacific Region. He succeeds Carl O. Martin, Western manager of Benjamin Electric & Mfg. Co.

Has the answers

"What kind of information do you look for in manufacturers' advertising and promotion?" contractors in all parts of the U. S. were asked by Electrical Construction & Maintenance. Anaconda Wire & Cable has checked its general catalog against the answers from contractors and claims that the catalog answers practically all that came within the scope of a catalog, even to product improvement items. These catalogs are available to established contractors from the Anaconda offices in San Francisco, Los Angeles, Denver, Seattle.

New officers

Puget Sound Chapter, NECA, elected Charles F. Meagher as its president at last month's annual election. Don Close was named governor; John Sroufe, vice-president, Seattle Division; W. D. Winery Jr., vice-president, Tacoma Division; and Robert Groseclose, of the Alaska Division.

In Utah also

Utah-Idaho Chapter, NECA, re-elected W. Phil Robbins as its president, with C. I. Berrell Jr. as vice-president and L. A. Herdti as treasurer. It was holding a special meeting at Idaho Falls, July 31, to arrange for assistance to G. A. Howarth, manager, who has been recovering from illness.

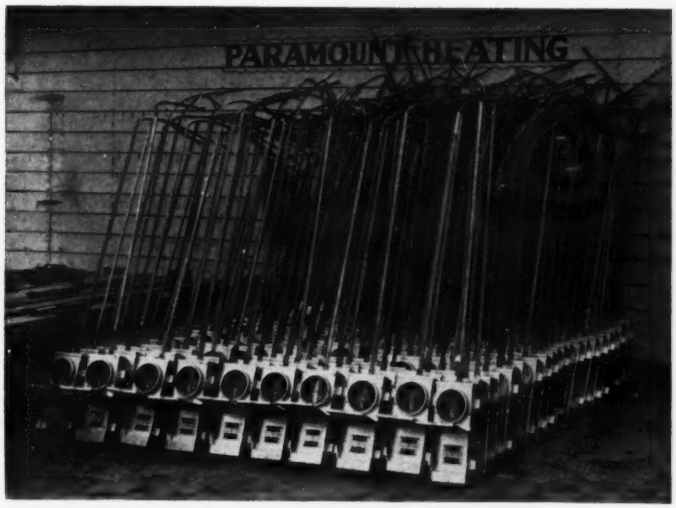
Chapter huddle

Northwest Conference of NECA Chapters, meeting in Portland, last month, heard E. B. DeFeyter of Spokane report on the District 6 representatives meeting with IBEW Vice-President Harbak over labor difficulties; it discussed the powder tool controversy with the unions, Larry Rodgers of Oregon-Columbia Chapter telling of the Oregon safety rules recently adopted; discussed possible joint meetings with architects and wholesalers for better mutual understanding; heard a report from R. C. Hughes of Spokane, chairman of the Line Constructors Section; discussed preliminary plans for the next District 6 meeting in Seattle, April 24-26, 1953; then participated in the picnic of the host chapter, the Oregon-Columbia Chapter, at Marelco Ranch, owned by Damon Trout of Marine Electric Co.

A start is made

A Nevada chapter of NECA is being formed by the 12 contractors who joined NECA from Las Vegas recently and elected Harvey Luce as its president and Shorty Reitz as governor. Divisions at Elko and Reno are contemplated in the future.

Wireman installed preassembled service in about 10 minutes plus 10 for grounding



Services mass produced in the shop with combination breaker-meter load center cans

Electrical contractors Lou Wetzel and Jim Kuster of Long Beach found that . . .

Preassembly Speeds Mass Housing Job

When Kuster & Wetzel, electrical contractors of Long Beach, approached the wiring of 17,149 homes at the Lakewood Park development they did so with the experience from housing projects at Encino, Stocker, Alhambra and Westchester, Los Angeles. One mass-production technique used was to standardize on equipment, both in tools to speed installation and in products to install.

For services they used combination weatherproof, flush-type meter socket and load center assemblies furnished by Square D Co. ready wired. In the contractors' field shop where materials were delivered direct by the wholesaler, L. B. Marsh, specialized crews assembled the services, about 50 per man per day. Bundles of electric metallic tubing were cut at a time; service wires likewise. Wire strippers cleaned the terminals. Automatic screw drivers speeded the assembly. Complete service assemblies were delivered to the houses ready for another specialized crew to install.

Similar organization of all materials needed for each house into tote boxes for delivery placed all needed materials in the hands of the specialist crew at each house as they came to it. Similarly the finish materials were there when needed.

A. K. Bennett finds it easier to sell any couple planning a house with means to make

Adequate Wiring Visualized

Many are the devices that have been thought up with which to try to sell adequate wiring. They include all kinds of display boards and kits. Truly something is needed to help people who are planning a house to visualize and appreciate the importance of adequate wiring.

In Los Angeles A. K. Bennett of Los Angeles Department of Water & Power is enthusiastic enough to talk anyone into a more adequate job but he even goes farther. He has his office set up so that he can demonstrate every point. His services as an advisor to all customers of the utility are publicized widely. Contact personnel of the department also steer to him many prospects. When they come to the office with their plans he has everything installed and working with which to show exactly what he means.

As they sit at his desk and talk over the plans, by means of a portable panel of remote-control low-voltage switches he can turn on built-in ceiling lights, kitchen units, spots, floods, chimes, etc. Taking them over to a display along the walls, he can describe the functions of the meter and main service cabinets, then the circuit-breaker distribution panels. He has plug-in strip to show how convenient such a feature can be. He has literature and sample devices. He can really sell.

The services of the utility's architectural service group are offered for drawing up wiring plans, kitchen layouts and the like. Certification of the wiring is then recommended and the Los Angeles Electric League inspects and issues a certificate. For tract homes that have been certified, a lighted billboard advertising the home, its builder and electrical contractor is set up by the department.

Other A-W News of Progress

Lifting of the copper restrictions for house wiring has once more unleashed promotional activity on adequate wiring quite generally. But the newest phase of the national program is the release of a new plan to sell home wiring modernization. This market of some 22 million existing homes has been the hardest of all to crack. But the National Adequate Wiring Bureau has a plan book in which successful programs in three different areas are outlined. One is in a large metropolitan city, another in a four nearby city area, and the third is in a small town.

As typical of the results in one campaign 292 wiring modernization jobs brought electrical contractors $47,592 worth of wiring business in 1950, an average of $162 per job. It brought wholesalers more business in lighting equipment and appliances and the utility more revenue from the same customers. Details are available from the NAWB, 155 East 44th St., New York.

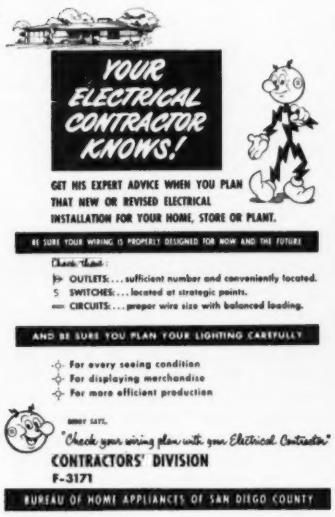
In Denver the Rocky Mountain Electrical League and Public Service Co. of Colorado have intensified their activities on adequate wiring. The Southern Colorado Power Co. at Pueblo also is becoming active in the work as staff is being added to the sales department for this kind of activity. In Denver the certificates now are being made out by the league and then John Garvin, contact man for the builders and contractors, delivers it to the contractor and together they deliver it to the home owner, telling its significance and value. Garvin also contacts homes interested in electric range installation and endeavors to have a full installation put in at the time. Contractors in the area are calling upon the league more for certification.

In the Pacific Northwest, Tacoma is setting up an adequate wiring bureau for inspection and certification, and the public utility district at Everett is doing the same. More action is also expected in Seattle where the Electric Club is the certifying agency.

Some A-W Selling Techniques

Lighted posters tell the passing public

Bennett explains the meter and main service and then shows prospects the circuit panels


YOUR ELECTRICAL CONTRACTOR KNOWS!
GET HIS EXPERT ADVICE WHEN YOU PLAN THAT NEW OR REVISED ELECTRICAL INSTALLATION FOR YOUR HOME, STORE OR PLANT.
BE SURE YOUR WIRING IS PROPERLY DESIGNED FOR NOW AND THE FUTURE
Check that:
OUTLETS... sufficient number and conveniently located.
SWITCHES... located at strategic points.
CIRCUITS... proper wire size with balanced loading.
AND BE SURE YOU PLAN YOUR LIGHTING CAREFULLY
For every seeing condition
For displaying merchandise
For more efficient production
"Check your wiring plan with your Electrical Contractor"
CONTRACTORS' DIVISION
F-3171
BUREAU OF HOME APPLIANCES OF SAN DIEGO COUNTY

In San Diego contractors are advertised

ADEQUATE WIRING PREVENTS JAMMED OUTLETS
SUFFICIENT OUTLETS AND CIRCUITS WITH A LARGE SERVICE PERMIT YOU TO USE Electricity FOR ALL HOME NEEDS

Window displays translate wiring into terms of customer convenience in familiar cases

Fringes Will Bring Complications

When Pandora opened the forbidden box, as told in the mythological story, out flew a horde of troubles to plague a world.

When the Wage Stabilization Board opened up the steel formula decision, not only did a plague of troubles afflict the steel industry but the plague spread in many different ways over all American industry. One of the troubles that it loosed was a signal for the unions to go ahead on welfare demands.

Immediately pressure came from all the unions for a similar approval for health and welfare funds and the Wage Stabilization Board issued Regulation 19. This provided that contributions to health and welfare funds to finance certain insurance, hospital, disability, medical and surgical benefits could be made in addition to all other increases in wages.

In the construction industry there exists a separate commission under the Wage Stabilization Board dealing with construction wages. Pressure was exerted immediately by the construction unions to adopt similar regulations. Yielding to that pressure the Construction Industry Stabilization Commission adopted Regulation 19 with its own CISC Regulation 2 on April 1, 1952.

The main point of difference between this and Regulation 19 of WSB is in the cost to the employer in providing the allowable health and welfare benefits. Under WSB's Regulation 19 a limitation is placed on the types of benefits without limitation on the cost to the employer. CISC felt that these costs could become very expensive to employers, especially in areas covered by small local unions, and so Regulation 2 limits the amount of employer contributions for which automatic approval may be secured to 7½c per hour. It permits the purchase of one or all the benefits provided if they can be purchased within the 7½c limitation.

The question then becomes how much can be bought for 7½c per hour.

CISC issued standards of approval for health and welfare plans in the construction industry. In the normal case the commission approves employer contributions of 7½c per hour to a welfare plan if these are to be used to provide some or all of the following types of benefits for employees, retired employees, their wives and dependent children under 19 years of age:

1. Temporary disability.
2. Hospital expense.
3. Surgical expense.
4. Medical expense.
5. Group life insurance and accidental death and dismemberment benefits.

While under Regulation 2 benefits are limited to this list, in cases where parties to a local collective bargaining agreement negotiate benefits other than those listed, or in excess of 7½c per hour, the commission will consider the case in accordance with its individual merits.

Ever since such a ruling insurance men with benefit programs to sell have been beating the bushes, eagerly trying to stimulate this business. After doing a little rough figuring the AFL Building Trades Council in the San Francisco area has issued a statement that it would set up its own program to save the brokerage fees and attempt to get more benefits for its members from the amount of money put into the fund.

A long carpenters' strike in northern California was over the issue of a benefit contribution by employers even though the union had no program available on a definite basis to which the employers could contribute. Other recent wage negotiations have had the welfare issue thrown into the negotiations and, although few have set aside the funds as yet, there is considerable talk that next year all negotiations will have such welfare plans as demands by the unions.

Therefore it is well to look into some of the factors involved in such appealing but complicated programs. The cost also needs examining.

It is well to remember that benefits under such plans do not become available immediately. The first step taken is to create a joint committee. This committee has to count the number of persons to be covered, the benefits to be provided, the amount of money required to insure actuarial soundness of the plan, and similar other factors. Then it takes time to explore and consult with various insurance companies over plans to find what benefits can be provided and the cost of providing them.

CISC has indicated that the normal procedure is somewhat as follows:

1. Employers and employees agree that a contribution of so many cents per hour will be contributed to a trust fund to be used for the purpose of providing certain health and welfare benefits as they become available to employees at a determined future date. A joint committee is appointed to determine what the benefits are.

2. The labor agreement has to be amended to require the payments and the contributions to be paid as of an effective date. Meanwhile the joint committee conducts a continuing survey to cover the eligible participants, the best possible coverage they can get, investigates the actuarial soundness and has to bargain with various carriers of insurance for the maximum coverage obtainable.

3. The joint committee then recommends the provision of certain benefits. These usually have to be passed upon by employer and employee representatives.

In its Regulation 2 the CISC has indicated it will approve an agreement to make payments into a health and welfare fund prior to the actual establishment of the final plan itself, provided that the payments are payable to a trust fund under a written agreement. This agreement must stipulate that:

"1. The fund be used only to provide health and welfare benefits of the character defined in the regulation.

"2. No part of such fund may revert to the employer.

"3. No part of such fund will be paid to a labor organization or employees except in the form of the health and welfare benefits.

"4. A plan will be established and the payment of benefits will commence within 12 months from the start of the contributions unless, upon application, the time is extended by the CISC.

"5. In the event the parties are unable to agree on any questions concerning the health and welfare plan, the issue will be submitted to final and binding arbitration."

These provisions are all based on an acceptance by both unions and employers of the idea of health and welfare plans. It will be seen how complicated the establishment of such a program is on its face, without going into the infinite detail of the accounting, the adjustments in regard to income tax and other questions.

The major question to be answered and that seems to be taken for granted is whether the public is either willing

or able to pay for the increased burden upon cost of labor already receiving very high wage scales. After all, while the plans may be high sounding and admirable from an idealistic standpoint, it is neither the employee nor the employer who pays the bill, it is the public. If the public revolts at paying these additional burdens upon an already high labor rate there will not be enough money collected from that public with which to make any plan work.

More Burdens

the prices will have to carry

It's not the wages, it's the overhead. Electrical contractors have always been generous in wanting to see their good workmen get more earnings and often put up very little resistance to union demands for increases in wages as costs of living go up. As a result wages of electrical workers are among the highest of all the building trades and those of the building trades are much higher in scale than the manufacturing trades. Faced with future demands for health and welfare plans in addition to a pension already granted, a number of contractors are beginning to look the facts and figures in the face and are asking where is it going to end.

This question in their minds is made more painful by a realization that (1) More and more materials are being bought by home owners and proprietors of businesses for installation by themselves (either directly from wholesale supply houses or from chain mail-order houses); (2) more permits are being taken out by owners from city electrical departments for doing their own installation; (3) more electrical work is being "bootlegged" by electricians on their week ends for friends or for home owners or business house owners; (4) more nonunion wiring of small homes is being done in areas where union membership is not all-inclusive.

Established electrical contractors must pay their annual renewal license fees and taxes and must also add the cost of doing business on their selling prices of either labor or materials. It has been estimated roughly that the overhead burdens must be carried on the price of work that is contracted or done on a time-and-material basis.

Without considering the expenses that must be added to handling of materials, the direct labor burden and the indirect job burden total 31.7% or $31.70 on every $100 of labor.

It is this $31.70 on $100 that individuals apparently are attempting to save by doing their work themselves or having it done directly by those who do not put these factors on their wage scale.

While this apparent saving may not truly be realized by the inexperienced person performing a specialty type of work, contractors are unable to combat a condition like this in face of the figures or estimates they need to submit for doing a job. The contractor cannot escape some of these expenses (about 10% of which are required by law—such as compensation insurance, social security, unemployment, etc.).

If health and welfare are to be added to these the contractor faces a still more difficult job of selling his services, loaded as they are with these overheads, old and new.

Short Code

In response to a demand for an abridged edition of the National Electrical Code covering only those sections dealing with residential and small commercial wiring, a committee of the Electrical Section, NFPA, has been working on the problem. The original request came from the Pacific Building Officials' Conference, which wanted to incorporate such a short form of the National Code in its uniform Building Codes. Harry V. Dobson, chief electrical inspector of Santa Barbara, is the Southwestern Section member on the special committee considering such an abridged version.

When the Electrical Section, NFPA, met in New York City June 9, the first draft of such a proposed abridged code was presented. Considerable discussion of it referred it back to the special committee for further study. At the present time it has no official status. Copies of the draft may be obtained from NFPA at 60 Batterymarch St., Boston 10, Mass.

Where situations arise that are not covered by the abridged edition, it is intended that reference be made to the complete edition of the National Code. With a few modifications there would be sufficient rules in the abridged edition to cover at least 95% of all electrical installations in the country and provide simpler rules for the average electrical worker and contractor. Others felt that it would only tend to confuse rather than aid the industry.

The original draft proposed to include Articles 110, 200, 210, 220, 230, 240, 250, 300, 310, 324, 334, 336, 338, 346, 348, 350, 352, 370, 373, 374, 380, 384, 410, 422, 430, 510, 600, 730, 810, 900 (about a quarter of it included), Tables 1 and 2—Notes 4 and 5 (without the factors), Tables 4, 5, 20, 21, 22, 24, 26, 27, 29 and 31. This would also leave out 248 Sections and 32 Paragraphs.

Deletions would include Articles 100, 280, 320, 328, 340, 342, 344, 351, 354, 356, 362, 364, 390, 400, 445, 450, 460, 470, 480, 500, 520, 530, 540, 610, 615, 620, 630, 640, 650, 660, 665, 670, 700, 710, 720, 725, 800 and 900 (about three-quarters deleted), Factors and Notes 1, 2, 3, 6 and 7 of Tables 1 and 2, and Tables 3, 9, 11, 12, 13, 16, 17 (type V), 18, 18a, 19, 23, 28, 30, 32, 33 and 34.

However, at the Electrical Section meeting the following changes were suggested in this first draft: (1) Delete Table 31—flexible cords; (2) add Sections 4001, 4003, 4004 and 4007; (3) add the following definitions in Article 100: appliance, approved, branch circuit, device, disconnecting means, feeder, fitting, motor branch circuit, outlet, readily accessible, service entrance conductors, service equipment and voltage to ground; (4) add necessary sections for low-voltage bell wiring and other current limiting circuits found in ordinary buildings.

Harry Dobson, Southwestern Section member on the committee, asks that any objections or suggestions be sent to him so that he can acquaint the other members of the committee with the feelings of members in the Western region.

These Must Be Carried on Price of Work

Direct Labor Burden	%	Indirect Job Burden	%	Material Expenses	%
Unemployment ins.	2.7	Assn. dues	1	Assn. dues	1.0
Social security	1.5	Tool exp.	2	Tool exp.	.5
Compensation ins.	5.0	Transport.	2	Transport	2.0
Pension plan	1.0	Misc. exp.	2	Misc. exp.	2.0
Portal exp.*	12.5	Estimate	2	Estimate	2.0
	22.7		9		7.5

*Portal expense, so-called, is that time lost getting to the job, cleaning up at the end of the day, coffee time, etc., all nonproductive.

Tenney Tappan Quimby

Quiet Market but

Although nicely timed between the two big political conventions the Western Merchandise Mart's home goods market week, July 14-18, was a quiet one—as the Chicago and Los Angeles markets had been before it. The Mart management estimated a 20% increase in attendance over last year but that was not evident in touring the appliance floor. Buying was cautious too and really new products were few. It had been so at the other markets as well. But the week brought one new feature —the panel of local experts to answer dealer questions instead of the usual two or three national speakers at the appliance trade dinner, Wednesday night. (See facing page for details.)

Among the new appliances were Crosley's rotating tray dishwasher, and its identical twin in American Kitchens at the Meyberg display. Frigidaire showed its new dryer which condenses its steam itself. Fowler Mfg. Co. of Portland showed its new dryer for the first time, in the Kaemper-Barrett space. Thermador announced, but did not have samples to show, its new built-in surface unit bank with an electric griddle in the center, and its new separate warming oven. The now separate Universal line of major electric appliances was shown by R. D. Schwalb Co., which announced a new two-oven fully automatic electric range for $339.95 and select-a-range combinations of two sets of drawers, top and oven for $299.95.

In O. B. Wilt's the Meier Electric & Machine Co. of Indianapolis line of electric space heaters with a familiar chimney, and a line of dehumidifiers, all thermostatically controlled, were new. Airflow line of portable clothes dryers now have a 220-v model at $179.

In the television field Elliott Epstein entered the Belmont, by Raytheon, for northern California dealers to see. Bendix Radio's new regional manager, Don Ross, announced Graybar in San Francisco was taking on distribution, a change in basic policy.

Among Eastern executives who visited were G. F. Keaton, vice-president of sales for Dexter washers, Jules Alexandré, sales manager of Duchess washers, and Ed-

Personalities at: Kaemper-Barrett's—L. J. Bjarnson, Lloyd Lynch, T. N. Biglieri and Stuart Baldwin; Meyberg's—Marcia Mead, Robert Barkley, Ed Halliday and Paul Morrison; Clyde Allen's —Clyde himself, A. B. Carlon, Wayne Dinsmore, George Hondlik; Bendix Radio—Barkley Furey, W. E. Derbyshire, Don Ross; Duchess Washer's—Jack Keim, Jules Alexandre, Larry O'Neill

Mattison Maag Lee

Lasky Germaine Doerr

a Lively Quiz Session

ward D. Hurd, general sales manager of Orley Corp.

Experts Answer

Instead of being *told* in a couple of formal addresses as customary the 600 dealers, salesmen and distributors at the appliance trade dinner had their own questions *answered* by a group of picked "experts" from the San Francisco region and presided over by Frank Runyan, president of San Francisco Merchandise Mart, and with George C. Tenney, editor of ELECTRICAL WEST, as moderator. The change was warmly welcomed.

Condensed, these were the questions asked and the answers given by Charles E. Germaine, Crosley regional manager; O. R. Doerr, PG and E sales vice-president; Philip G. Lasky, vice-president of KPIX; W. J. Lee, merchandise manager of Sherman Clay; Harold Maag, Western manager of RCA-Victor; E. A. Mattison, executive vice-president, Bank of America; Larry B. Quimby, manager, Breuner's, Stockton, and W. Hubert Tappan, vice-president, Tappan Stove Co., and Moderator Tenney.

Q—Do you agree that "anyone" who buys appliances at retail list is either illiterate, has bad credit rating or is stupid?

Maag—Not at all. There are many dealers all over the country who are selling appliances in volume without resorting to discounts.

Q—Are banks going to be more liberal in accepting retail paper?

Mattison—Most banks have been sales minded and have granted credit liberally. There have been 20 changes in Regulation W in the 11 years it has endured, which indicates how ideas change. But BofA has no plans for 36-month terms as yet.

Q—Why did the telecasters in the S.F. area fail to get together and centralize their sending towers?

Lasky—They did not all get their construction permits from FCC at the same time. So much heat was put on KPIX by dealers to get on the air fast that it chose the Mark because it could do so fastest. The theory of centralized location had not been thought of until Los Angeles and New York tried it. Now KPIX is moving to Mt. Sutro from the Mark location.

Q—What is the utility's plan for promotion of appliances that have unsaturated markets, such as dryers, dishwashers, freezers, disposers?

Doerr—PG and E is adding new plant capacity at the rate of a half a million dollars a day, which means retailers have to sell $2 for each dollar spent by the utility. Dealers and company each have a voice in the Northern California Electrical Bureau to decide which appliances should be promoted and there are many media through which to do this promotional work.

Q—Should retailers plan to place salesmen in the field for direct selling?

Quimby—There is a world of difference between direct selling and house - to - house. A more saturated market requires direct selling, whereas new and unaccepted appliances require house-to-house. Most appliances are well enough saturated that it is neither feasible nor profitable to sell house-to-house. But direct selling, going back to users and following prospects direct, is needed. Today a dealer cannot get men to work on a low salary and commission. He must pay a good living salary; must train them well; must provide a bonus incentive instead.

Q—Should manufacturers rewrite their guarantees so dealers would not be obligated for service labor?

Germaine — Policies on warranty have long been in effect. Any change would simply mean a reshuffling of the funding of the dollar. If the dealer doesn't put up the labor then the manufacturer or distributor will have to and readjust margins accordingly. What most dealers really complain about is the "nuisance" labor of extra callbacks, and this is caused by ignorance of the customer as to how to operate the appliance. If demonstrated well upon sale this can be eliminated. If a dealer does not want to get into labor and service, all manufacturers have plans with separate service organizations. But service offers a dealer the finest opportunity in the world to call back on customers and make them happy, resell the appliance and through satisfaction get leads to sell neighbors and friends.

Q—Is the sale of gas ranges disappearing as stated in the Wall Street Journal recently?

Tappan — The scale of electric ranges has increased but in the same period sales have increased in gas ranges by the same percentages. The gas range is replacing kerosene or hard fuel and sales vary in different regions depending on local fuel supply. (He quoted PG and E figures for the area.) The gas range industry does not have the big national manufacturers that electric does—such as G-E and Westinghouse. There are many small Western manufacturers who give quick service. There is no indication that electric is going to overwhelm gas in the near future.

Q—What is your opinion of manufacturers using overproduction of a product, say 1951 refrigerators, as a promotional

item when the 1952 line comes in, forcing retailers to sell below previous cost?

Lee—The appliance business is a volume business and a replacement business. Its position of vertical growth ceased for most appliances a few years ago and a larger proportion of sales are for replacement. I can't see anything wrong in manufacturers clearing their stocks in that way. Retailers just must be on their toes, must not overstock, and they won't be caught that way. I can't see any solution for it when manufacturers bring out new models every six or eight months. A dealer should stay in character. Don't try to be a wholesaler, be a retailer. Let the wholesaler be the supply house he is meant to be and you draw from it when you need it.

Q—When are we going to have additional VHF or UHF stations?

Lasky—I would need a crystal ball to tell what FCC is going to do. But it is working hard to clear all the applications. So far as I know no one has applied for any of the five UHF channels allocated to this (S.F.) area. On the FCC list for consideration San Francisco is near the bottom. It will be two or more years. San Jose so far has not filed application. There are two channels for Sacramento and Stockton and both are contested, which means delay.

Q—Why do banks follow different policies in accepting paper from different dealers, and why do branches of the same bank also differ?

Mattison—As for other banks it would be simple if all accepted one plan but competition makes for variety. As between branches there should be no variation for all have the same specifications. There is a difference though between dealers as to their credit responsibility.

Q—Is the retailer disappearing from TV as indicated by Fortune?

Maag—Retailers are not disappearing. Some are dropping by the wayside. TV is attracting many people into it but thousands of retailers continue to exist in it. Tenney—The West has not been afflicted with as many discount houses as other parts of the country as yet.

Q—What do retailers feel about manufacturers spending thousands on trips, bonuses, etc., when they keep discounts so low?

Lee—The cry of dealers for larger profit margin is national. Many fine merchandising outlets are throwing TV out because they find it impossible to make any profit from this business. For some reason the manufacturers have predetermined the margin on volume. They must realize that it is a mistake to discourage retailers of a reputable type. The Better Business Bureaus are loaded with complaints of people because of the practice of the Johnnie-come-lately's who are in it only for a quick buck on volume. Naturally an established retailer is discouraged when he cannot make any money to see these trips and bonuses, but the retailer of TV loses more money as he sells more.

Germaine—I cannot speak for the reasons for present margins but what the manufacturer thinks about bonuses and trips is that there is terrific competition between industries for the consumer dollar. In this building (the Mart) there are nine floors of manufacturers' goods in the home field alone knocking themselves out to get this spendable percentage of the consumer's dollar. The manufacturer feels justified in ploughing back some of his gross into incentives to dealers to sell ranges and appliances instead of beds.

Q—How can dealers improve trade-in practices to reduce losses?

Quimby—At present levels it is not practical to recondition and resell traded-in appliances at a profit because of high labor and parts costs. Even adhering to a so-called "blue-book" for trade-in values it can't be done. The only solution I see is in salesmen's education. They must be taught how to sell without using the trade-in as a tool to close a sale; sell the product instead of an allowance.

Q—What are the prospects for business this fall?

Tappan—The steel strike, if ended today, would mean manufacturers could not expect a month's supply for the whole balance of the year. If you have a warehouse full of cats and dogs, shake hands with yourself. You can sell them now.

Doerr—(Spoke of the long range prospect as bright for the area.)

Quimby—A financial service has predicted an upswing in the fall but the steel strike may affect supply, but sales should be good.

Germaine—The problem is really one of knowing how to sell the product when you get it.

Mattison—California looks excellent to the banks, except for the strikes.

Tenney—The McGraw-Hill department of economics predicts a high for the fall.

Lasky—Advertising commitments on radio and TV are good. There have been some cancellations from auto people and others using steel.

Maag—Excellent prospects for the next six months. Better programs are due in the fall. Lifting of the freeze will boom TV sales.

Lee—If a retailer considers that he is comparing present volume against larger comparative figures and does 8 or 9% increase as against 1951 he will do all right.

Q—Why should appliance manufacturers sell direct to speculative builders when they have franchised dealers in the area?

Germaine—As a basic policy manufacturers do not sell direct to builders. Because some distributors carry the same name as their manufacturer some confusion exists, but it is distributors who sell to builders. If this were not done you would find that electric ranges and refrigerators would not be in a favorable position in respect to gas. If distributors sell in this highly competitive business it is in defense of their dealers, if you please. For they help to create satisfied customers for the product and each user is worth seven more. If dealers sold it would curtail the number of units sold because builders buy on price. What dealer would want to do business on a margin of about $2 gross on a refrigerator?

Tappan—The dealer is not going to get this business anyway in that kind of a competitive market. If the manufacturer doesn't get his product in, someone else will. It familiarizes the public with that brand and when these people buy their own appliances they are used to that brand.

Q—Why doesn't the utility institute 220-v services to assist in the sale of electric equipment.

Doerr—With a balance between the gas and electric investments to maintain, the utility is never again going to subsidize wiring. It is entirely in the dealer's hands which he sells. The customer makes the choice. The utility helps him get service for that choice. Free wiring is out in this area, never to return.

At the opening of the meeting Frank Runyan declared that the buying at the market had shown significant improvement the last three days. The basic ingredients for a prosperous retail business were present in the higher buying capacity of the public, accumulated savings and increases in Western population. Greater selling efficiency is needed to move the many improved products available to users. Newcomer salesmen, he said, knew little but New Deals, old-timers have grown too cautious. Both need revival.

ELECTRICAL WEST Sales Guide

News Letter

August 1952 ©

FOR THE ELECTRICAL MERCHANT OF THE WEST

Television stole the show during the two national conventions and Denver stole the TV show in the electrical industry when its KFEL-TV was rushed into operation six days after FCC gave it a construction permit and one day after its license it was on the air, with a temporary antenna atop Lookout Mountain and station equipment flown in with an installation crew from RCA. Although getting itself ready for TV in an expected 30 to 60 days, Denver was caught off base by KFEL's speed. About 55 dealers were franchised and had sets but not enough for the boom demand that exploded. Manufacturers flew in cargo-plane loads of sets. Carloads en route were diverted from others to Denver. About 1,000 sets were sold the first day. (See Howard Emerson's story on the fabulous event in next month's Electrical Merchandising.)

TV with speed

Construction permits have been granted to uncontested channel applicants in Portland, Spokane, and every day or so more permits are granted as applications are processed. Contested channels will have to wait for hearings. But Portland should have a station going in a month, Spokane also, Denver one or two more. Others may be delayed getting equipment as stations throughout the nation clamor to get it.

More booms coming

Phoenix and Seattle received a big boost in TV sales from the advent of coaxial cable and network programs. It gave viewers instantaneous reception of the conventions. Phoenix's Appliance Merchandisers Assn. capitalized on it by holding a "Miss TV Cable" contest, in which customers for sets voted for glamour gals sponsored each by a make of TV. Even before the conventions 3,000 sets had been sold. Seattle's trade reported the best TV selling since telecasting began.

Cable stimulates

A 40 to 50% increase in TV sales was reported by J. Clark Chamberlain, San Diego Bureau of Home Appliances, which preceded the conventions with a two-month promotion of TV. White goods sales have also improved 10 to 15%, freezer sales are four times 1951 sales.

Promotion pays

Salt Lake City's Intermountain Electric Assn. reports a 15% rise in sales from the convention interest. Dealers held open house evenings during the conventions. Another promise of better interest and market is that both KSL and KDYL are moving transmission towers to a mountain peak across the valley that will give coverage to 90% of Utah, southern Idaho and eastern Nevada, doubling the potential market. White goods sales have improved, freezers especially. The range program to nonusers by league members had 114 participate, 10 distributors and some dealers sold as many as 20 ranges, all sold more than normal.

Move to mountain

To the surprise of many, President Truman signed the McGuire Fair Trade Act that managed to get through Congress before adjournment. The act does not prevent mail order selling across state lines, which many advocates wanted but could not get Congress to include. One group wants to go back to the next Congress to amend that into it but others are satisfied now to let it rest. Immediately most electric housewares manufacturers placed their top line under Fair Trade. There was some speculation whether the Dept. of Justice might drop its case against Sunbeam Corp. Proctor even announced lower prices on its list, all placed under Fair Trade as an extension of its "Partnership Plan."

Fairer deal

Angered by the raise granted the steel companies in order to get the long strike settled over his protest, Arnall was deaf to pleas by the retail trades to lift controls. National Appliance & Radio-TV Dealers Assn. and Radio-Television Mfg. Assn. both petitioned for decontrol, showing that selling prices now are below ceilings in most cases and it would eliminate much detail and bookkeeping. So far all OPS has done has been to reduce staff and make minor changes in CPR 161 regarding comparative pricing, CPR 7 regarding door-to-door selling, pricing of job lots, auctioneers, and CPR 22 at factory level regarding refrigerator and freezer shipments on delivered prices.

Price turmoil

Not guilty pleas were entered by the Golden Gate Chapter, National Electronic Distributors Assn., five companies and six individuals in an antitrust case brought by the Dept. of Justice, and a jury trial is set for Nov. 17 in San Francisco Federal Court.

Will fight

New manager of the Appliance Merchandisers Assn. at Phoenix is E. W. Cowdry. He succeeds Jack Canady who went with Palmer Mfg. Corp. Bill Cowdry's experience includes sales work for Standard of California, a department store in Regina, Can., and he left a merchandising and advertising executive job with Iowa Power & Light Co. at Des Moines to move to Arizona. Recent activities of AMA were the TV Cable promotion, followed by a refrigerator and freezer campaign. W. A. Blees of Crosley addressed a big meeting July 16.

New manager

Seattle City Light has re-established a wiring allowance for customers not now using electric range and water heater. Both P. C. Spowart, assistant superintendent, and Seattle Appliance & Music Assn. announced the plan to all dealers in the city. For range only it is a $30 allowance, $25 for water heater only, $55 for both. An additional $25 is allowed customers using old side-arm water heaters to get them replaced by a 50-gal or larger tank. This does not apply to new homes.

For the All-Electric rate

After considerable personal contact by a committee of the Seattle Appliance & Music Assn. with distributors and master builders, a policy mutually satisfactory to all seems to have been worked out for mass sales of appliances to building tracts. Legitimate builders who buy up to 25 units get 15%, for over 25 units a basis of agreement is worked out by dealer, distributor and builder. The dealer makes the sale and provides the service warranty, makes the installation and necessary call backs.

Builder sales

Yuba-Sutter Gas & Electric Appliance Assn. featured the Magic Key promotion to direct heavy traffic to 10 exhibitor members at the Yuba-Sutter County Fair, July 31-Aug. 3. Keys were to try to unlock 10 treasure chests, in which $500 in prizes were locked.

Pass keys

Fall convention of Pacific Zone, National Assn. of Electric Distributors is at Hotel Del Coronado, Oct. 6-8; Nelson R. Thomas, chairman.

NAED

Dr. Allen B. DuMont to speak on the future of the electronics business and John C. Sharp, president of Hotpoint, on the appliance industry will comprise the complete program of the 20th anniversary banquet of the Bureau of Home Appliances of San Diego County, to be held at Hotel Del Coronado, Sept. 26, with Harry E. Callaway, Thearle Music Co., and recently elected president of the National Assn. of Music Merchants, as general chairman. As a big promotional tie-in, the week from Sept. 22-27 will be advertised and celebrated as Electrical Living Week. This energetic Bureau is also almost sold out on space for its 15th annual Electrical & Home Appliance Show at Balboa Park, Nov. 28-Dec. 3.

Big doings

San Francisco's big Electrical and Home Show, by Northern California Electrical Bureau and National Home Builders Assn., at the Civic Auditorium Sept. 27-Oct. 4 will now have one entire wing devoted to a lighting show, using G-E's excellent "Bright Future" color film in a center auditorium with model room and house lighting displays along each side. The main auditorium, says LeRoy H. Bennett, manager, will share appliance exhibits with home building and gardening displays, a model home by Sunset Magazine and a strong entertainment program.

Big show

Electric League of Los Angeles has been running a Cost of Doing Business Course as a request that came from an open forum meeting over the difficulties in the appliance and television business. President Ed Young, Sues, Young & Brown, advised good dealers to select good distributors. Dealers advised all to know more about good business operation. Glen Logan, manager, announced TV sales during June and July to have broken records. TV saturation in the area is now 70%.

Better business

Distributor changes continue to be fluid--Bendix TV and Radio opened a regional office in S. F. Merchandise Mart with Donald Ross as regional manager, Bartley Furey in Seattle as Northwest district sales manager, and George Dyna, Los Angeles, Southwest manager, and changed back to distribution through Graybar in San Francisco, Seattle, Sacramento, Oakland. Los Angeles distributor hadn't been selected. At Graybar, W. E. Derbyshire heads Bendix sales in northern California. . ZCMI in Salt Lake City becomes distributor of Estate ranges and Emerson TV and radio. . Graybar in Salt Lake City becomes Hoffman radio and TV distributor. . Sylvania has made Western Empire Distributors Co. its new distributor in northern California. Partners in this new firm are oldtimers Don Courtleigh, gm; St. George Holden Jr., office manager; Barrett Wells, advertising sales promotion. Are located at 715 Bryant, San Francisco. . Hamilton Beach small appliances has named the Corwin Co., 1147 S. Hope St., Los Angeles, as new distributors. . Afton-Lemp Electric Co., Boise, is distributor in Boise area for Perfection Stoves. . In Denver the new Coolerator distributor is Contractors Heating & Supply Co. . G-E has named F. B. Connelly Co. of Oregon as Oregon and Southwestern distributor for its heating pads and electric blankets. . Eureka division of Eureka-Williams Corp. has made Hamilton Distributing Co. its Phoenix distributor. . Harry L. Shane will distribute the line of Tracy Kitchens of Edgewater Steel Co. in southern California. . Admiral's new Golden State Appliance Distributing Co. at 242 S. Anderson St., Los Angeles, with Arthur J. McGettrick as vp and gm, George Prendergast as operations manager, J. R. Hill, service manager, and George Gramlich, ad manager, and Charles Mack, credit manager, reports bigger sales from its new organization plus the sponsorship by Admiral of national convention telecasts. . Arvin Industries appointed Kassler & Co. of Los Angeles as southern California distributor. . . H. T. Waller, formerly with Progress Co., succeeds the latter as distributor of Philco in Long Beach. . CBS-Columbia has Pacific Telecoin as S. F. distributor now.

Line changes

They shall have music

If others follow Westinghouse's newest gimmick the home will be full of tunes for the newest Westinghouse clothes dryer plays "How dry I am" when the dryer gets through drying. It is matched with a new model washer and the pair called twins in Westinghouse promotion, introduced to the West in a series of meetings attended by T. J. Newcomb, W. B. Creech, J. J. Anderson from Mansfield and Walter Baker, Pacific Coast district manager of the appliance division.

People - news

Names that make news--R. R. Quandit becomes factory representative for Hoover Co.'s special products division for the area from Salt Lake City west. Rebuilt cleaners, irons, floor polishers, dustettes are in that division. . Roy Hurd, manager of the San Francisco appliance stores of Hale's, is now manager of all appliance stores of the Broadway-Hale's group, known as Broadway TV and Appliance Stores, in Los Angeles and San Francisco. . Hale's, by the way, opened a big new TV and appliance department on the third floor of its Oakland store, Aug. 4. . M. F. Barnes is now regional sales manager for Zenith with S. F. headquarters, from Denver west. Was former Southwest manager. . Guy Farwell, who retired as buyer of Sterling Furniture Co., S. F., has bought controlling interest in The Electric House chain of 7 stores in San Bruno, San Mateo, Burlingame, San Carlos and Redwood City. William Reifschneider remains general manager and present employees are all retained. .. James M. Tuttle has been promoted to Western division sales manager of Motorola Inc., and Ashton H. Hulbert manager for the Northwest in Seattle. . William C. O'Brien and Bob Meyers have been appointed DuMont sales representatives in Los Angeles.

... and more

At Westinghouse Appliance Nancy Ellen Johnson becomes the Pacific Coast regional director of home economics as Lois Ferris left to get married and Miss Johnson, headquartered in San Francisco at the Mart, will cover the northern part of the area as Christine Dent will the southern section. At Westinghouse Electric Supply William P. Frost was promoted from radio and TV sales manager at Vernon to southern California district radio and TV sales manager. . Well known in the West, Howard Oliphant has just been made manager of marketing for G-E's range and water heater department. . David J. Hopkins, just recently president of Emerson West Coast Corp., now becomes director of sales and advertising for Emerson Radio & Phono. Corp. in New York. . Monarch Ranges announces that J. W. Boehler, 6876 Hawley St., and K. A. Ullrich, 6531 Eastlawn, Oakland, take over sales from the late Glenn L. Brown. . B. J. Badham Jr., Hoffman Hardware, Los Angeles, succeeds Kenneth J. Dahm of Denver as new president of Pot & Kettle Clubs of America.

Coming attractions

New things promised--Noma will have for the Christmas trade many new lighted ornaments, among which is a plastic illuminated candy cane for outdoor decoration, 26 in. long, to sell at $3.95. . RCA-Victor is about to bring out some longer playing 45-rpm records on the same size disk, called Extended Play or EP. . Everhot plans to introduce a new electric blanket soon. . Hotpoint will offer a new preplumbed automatic dishwasher as soon as steel is available. It will not require a water trap so only the Qui-Konect feature is needed. . Nesco has a new line of roasters with copper outside shell. . Graybar, it is rumored, may build a branch on newly acquired property in San Bernardino. . Motorola announces first radios with complete plated circuits.

It pays to try

Servel is about to launch a nationwide ad campaign to sell both its gas and electric absorption-type refrigerators, offering to pay $1 a day for 10 days to anyone trying one of the freezers in their home and the customer can keep the money even if they buy the refrigerator. The aim is to shake the refrigeration business out of the doldrums, it says.

Coffee, waffles and jam served to more than 250 prospects attending demonstrations in the WWP lobby during the IEEL campaign

Electric Housewares Are Given a Lift

When the appliance section of Inland Empire Electrical League in Spokane selected electric housewares and electric ranges as its June objective it did so because:

1. An electric housewares promotion was needed to revive this business.
2. Dealer interest was nonexistent because of price cutting following the breakdown of fair trade laws by a chain drug and a jewelry store.
3. There never had been an organized campaign on housewares.
4. The success of a few specialty dealers during the 1951 Christmas season selling electric housewares at fair trade prices, using demonstrations, promotion, advertising dealer dependability and credit, showed it could be done.
5. NEMA made available an excellent promotion plan.

However since Inland Empire dealers were unaccustomed to electric houseware promotions and not inclined to do much, the committee felt it best to combine with an electric range drive. Both lent themselves to the gift and food preparation themes. Hence the campaign was built around food preparation. League advertising was to give more emphasis to housewares than ranges. Individual advertising also was encouraged, even though it was realized few dealers would spend much on it.

After the committee decided, then (1) range and housewares distributors were called to a meeting at which the plan was accepted and new ideas contributed; (2) a prospectus "Let's scare up some new business" was prepared, containing display tips, reasons for selling, steps to take to get results and offering NEMA materials; (3) league meetings were held in four trading centers to outline the campaign; (4) two additional notices urging tie-in by dealers were circulated; (5) an excellent brief training presentation on how to sell housewares and ranges was prepared by the home service advisors of Washington Water Power Co. (A professional quality skit portrayed the shortcomings of some presentations, then the right way to sell); eight classes were held in seven trading centers.

Special sections were published in the *Spokesman-Review* and *Daily Chronicle*, reaching a circulation of 162,000. The front page had a half-page league ad, surrounded by appropriate editorial copy and photos. Then throughout the section range and housewares ads were run with appropriate editorial copy. The league ad was run also in 28 other Inland Empire daily and weekly papers and dealers urged to run tie-in ads. Smaller ads by the league each week were run in all papers for four weeks.

Appropriate window displays were urged, continuous demonstrations too. The Washington Water Power Co. maintained in its Spokane office lobby a large display and demonstration of electric housewares, seen by an estimated 5,000 customers. Breakfasts of coffee, waffle and jam were served during the first two days to 250 prospects. All prospects were sent to retail dealers. The home economics department of the *Spokesman-Review* featured electric housewares and ranges in photos and feature copy in the Sunday issue following the opening sections.

In evaluation the league reported that final statistics had not yet been compiled. But the promotional director of a large local department store reported unofficially that the housewares and range volume doubled on the Thursday following the first newspaper section, tripled the next day. But this store's appliance department tied in at every possible point and took advantage of the training classes and other aids.

Results on the whole, however, were not outstanding for those who did little to participate. The sales training classes were not as well attended as they should have been. The advertising was good but there was not enough of it in follow-up. There seemed to be a general reluctance by dealers outside of Spokane to take part in advertising and tie-ins. For several reasons, such as lack of key-city funds, several wholesalers and factories were not represented by general advertising. The regional offices of principal electric housewares manufacturers were asked to tie-in locally with ads and store demonstrations but there was no response of any type to this proposal. But it's success for participants will beget more cooperation.

When Frigidaire's W. I. Buchanan (right) announced Harry Miller, Bill Baldwin and Bill Cronin (right to left) had been promoted to step up to new jobs, at Oakland show

Product Showings Plentiful

Summer brought the West a ripe harvest of appliance and television product showings and distributor meetings as well as its market weeks. Late June and early July they were on each other's heels so fast some overlapped. Dealers with more than one line were kept hopping.

Frigidaire put its series of dealer meetings in the laps of its distributors to man a big show. With scripts and props and training from the factory instead of putting a show on the road, the Western distributors all distinguished themselves as showmen under the test.

Called its "Midsummer Proof Program," the Frigidaire dealer meetings were launchings of a new automatic electric clothes dryer and to reawaken selling action on the other appliances of the line. Selling features and appeals for all were reviewed, advertising assistance told about and sales helps and gimmicks offered. The latter include kits with which to demonstrate proof of various quality features, premiums for users who furnish prospects (a "glass pantry" and a set of Pyrex dishes), a special window or store background for the laundry appliances. The new dryer has a built-in condenser to take out the moisture from the hot steamy air and requires no vents or plumbing connections.

At the Oakland branch meeting, an extra was the announcement that Harry Miller, branch manager, had just that day been promoted to assistant general sales manager and would leave for Dayton. His successor also was named, popular Bill Baldwin, and Bill Cronin was advanced to Baldwin's post as appliance sales manager of the branch. Bill Worden, assistant in the service department, was made division manager in the appliance sales section for the south San Joaquin Valley. W. I. Buchanan, Western regional manager, proudly made the announcement at the close of the Oakland meeting.

Westinghouse television and radio new models were shown in a national convention type of show in Los Angeles and San Francisco when F. M. Sloan, manager, home radio and television division; Joseph Walsh, general sales manager; E. L. Hadley, national advertising sales promotion manager; F. S. McCarthy, sales promotion manager; and T. B. Kalbfus, Westinghouse Electric Supply Co. radio-television sales manager, came West from Sunbury and New York. O. F. Achtenhagen, south West Coast district manager and John Walker, northern West Coast district manager, presented the line. L. K. Devlin, northern California district radio-TV sales manager for the supply company, explained the features of the new sets—ready for UHF channels, single-dial tuning, improved fringe area performance, ranging in price from $189.95 to $625, including tax and warranty. Professional actors put on the show.

Both the **Crosley and American Kitchens** divisions of Avco Mfg. Corp. staged spectacular showings of the new automatic dishwasher developed after eight years of research. The American Kitchens distributors for the Western States met in Los Angeles July 10. With the presentation of the new dishwasher, another program for kitchens for the next year was announced. W. H. Neil, Western regional manager, was host.

With the Crosley show came William A. Blees, smooth and sure vice-president of Avco in charge of Crosley sales; F. F. Duggan, general sales manager for appliances; Thoben Elrod, Western sales manager; J. T. Guertin, manager kitchen sales; George Simons, manager appliance advertising; C. S. Stout, manager builders' sales; Don Miersch, manager of range sales; Varley P. Young, director public relations; Jack Shepman, assistant to Blees; Robert Farris, dishwasher sales promotion; Robert Pearce, appliance sales promotion; Betty Olson, director of home economics; Doris Piper, director of kitchen planning; R. E. Schneberger, general service manager; a troupe of puppeteers and six stage assistants and $10,000 worth of scenic and stage effects.

The San Francisco meeting was the fourth and last of a series in New York, Chicago and New Orleans. To it came the Crosley branch managers from Portland and Seattle, J. N. Ceazan Co., Los Angeles; General Distributors, Spokane; Western Supply Co., Salt Lake City; Great Falls Paper Co., Montana; Appliance Distributors, Tucson; Graybar Electric, Denver; and California Electric Supply Co., San Francisco, was host.

Amana Refrigeration Inc. of Iowa reversed the usual completely when it loaded a United Air Line DC-6 with its sales executives and those of 54 distributors and flew them to Los Angeles, not to speak, but to listen. It divided them up in small groups and the Los Angeles distributors and dealers using food plans took them around to show them each step in operating a freezer-food plan so they could take the methods home and put them to work there. George C. Foerstner, executive vice-president, and Ed Hinchliff, sales manager, led the expedition. Western distributors and dealers were called in to consult with them.

F. F. Duggan, Crosley general sales manager, shows distributors Al W. Eskuche, Salt Lake City, James J. Flaherty, Great Falls, and C. J. Ward, Portland, the new dishwasher

Amana Distributors' Powell was the host to the visitors along with John Pollon, regional sales manager. Preston Cherry, San Francisco manager for Amana, and distributors representatives from Love Electric in Seattle, Ed Davis, Kaemper-Barrett, San Francisco, Glenn Jones, Arizona Hardware, Phoenix, also Leonard Fisher, and three successful dealers—Harold Kelly from Portland, B. S. Sears of Redwood City and W. B. Milgate of San Leandro—all were brought in as consultants.

Teach Blind to Cook

How do you go about teaching cooking to the blind? Few have had such experience but the home service department of Hawaiian Electric Co. in Honolulu, under Erma Meeks, director, reports its experience there for the benefit of other home economists.

She said at first it was a case of "the blind leading the blind" for, although the Bureau of Sight Conservation was consulted, all it could furnish were some fundamental hints on how to treat blind people. Libraries, factory home economists, institutions for the blind were contacted also. As a result several Braille books were found containing recipes and information about equipment. However much of this was beyond the scope of Hortense Clifford, the home economist who handled the class. So briefly it was a case of learning by doing.

A class was held each month, approximately 20 attending. At each a very simple demonstration was given, such as making a tuna casserole and Banana Betty, or muffins made by the standard method and also from a prepared mix. Class members participated very little but measuring utensils, pans and such were passed around to handle and feel. All activity was minutely described.

Procedure was informal and ideas constantly exchanged between members of the class. Each recipe was prepared from the beginning and each step explained in detail. At the end of the class, recipes used were given out and the food served. Recipes were requested as most of the students had family members who could read for them.

Although progress was slow the classes were greatly appreciated. Then after the January 1952 meeting a new procedure was tried. After general information was presented the group was divided and one half worked in each of Hawaiian Electric's two kitchens. Another home economist, Helen Winslow, joined the staff. This made for more participation and new interest in equipment was noticeable immediately. Automatic dishwashers, garbage disposers, washers and dryers were a new story to many of them but they were quick to see the possibilities they offered to handicapped persons.

Notes are being made by the girls of all the ideas learned about teaching blind students so that the information may be assembled and passed on to other home service personnel desiring to develop similar projects, Miss Meeks says. She invites any who wish such information to send their names to the home service department of Hawaiian Electric Co. and when the information is published it will be sent to them.

● **Without dues** or regular meeting dates, yet active, is a newly formed Radio & TV Dealers Assn. in Pueblo, whose main activity lately has been to prepare for the advent of TV broadcasting in Colorado. Dealers have been meeting on call to prepare a code of advertising practices, get their service organizations ready for TV servicing and to plan promotions.

A class of blind being taught cooking by the Hawaiian Electric Co. home economist

ELECTRICAL WEST

Campaign Platforms

SOME disappointment has been expressed over the failure of the Republican platform to spell out in concrete terms a natural resource and power plank. These critics point to the Democratic platform with its specific definitions of policy on rural electrification, power development, and transmission line construction as having more popular appeal than the generalizations in the Republican document.

We cannot agree with this critical attitude. The Republican candidates can be expected to spell out definite policy during the campaign. They can point with conviction to the places where the ax will fall on programs, agencies and people should their party win.

The Democratic plank on power follows the pattern of the whole platform, i.e., denounce the opposition and claim the whole world with a fence around it for the administration. Its charges deal lightly with truth and its claims of accomplishment are open to argument. It aims for the continued concentration of power and authority in the hands of the federal bureaucrats. Its ultimate goal is nationalization of the power industry.

All of these facts should have a bearing on how people in the electrical industry vote.

Nationalized Contracting

IN Great Britain, where the entire electric light and power business has been nationalized, the outlook is not a happy one for the electrical contractor. This conclusion comes from reading recent issues of British electrical trade journals.

Let American contractors ponder these quotations from various news reports and editorials in the *Electrical Review* and draw their own conclusions: "Is there any future in 'private' electrical contracting? . . . the present is not too gloomy in spite of the incursion of Electricity Boards into installation work . . . alert and efficient contractors can look forward to a busy and not unremunerative future, especially if they give due attention to the retailing side." At a contractors' convention one speaker asserted that if "Electricity Boards kept accurate accounts of costs, their installation departments would disappear."

It's doubtful if the significance of these assertions would have registered on us had we not just finished reading the power planks in the platforms of the two political parties. Electrical contractors might read them both with an eye to their future.

Night Selling to Working Public

"IF the pangs of hunger were not worse than going after food we'd sit in front of a TV set and starve to death," the keen merchandising minded William Blees, Crosley vice-president, told a surprised press by way of reporting that a revolution in the distribution of goods is taking place. He was saying that people in America, while plenty smart, are lazy and will not be inconvenienced by parking difficulties or shopping hours that interfere with their activities or comfort. Retailers are spending from three to five per cent too much in advertising, Blees said, trying to get people to do something they do not want to do—shop downtown at inconvenient hours.

Even opening one night a week is not enough. That is why there is such a trend to the neighborhood supermarket, open in the evening when both man and wife can shop conveniently, find plenty of parking space. Those stores in the appliance business so located, he said, are doing 150% more business than last year.

The reasons for it are that people are lazy, do not want to be inconvenienced. More women work than ever before and cannot shop in the daytime. Any item of considerable price requires the decision of both man and wife and they can only be reached in the evening or on Sundays when they are together. "Do you think they'd sell any

EDITORIAL VIEWS

homes if they were not open for inspection —and sale—on Sundays when both husband and wife can go look them over?

"Appliance dealers will even have to stay open Sundays if they want this business," said Blees. "We've got to lower the cost of distribution if we are ever to sell the productive capacity of this country. We will never do that if we don't do business where and when the public wants it. Why don't we be objective? We're supposed to serve the public, aren't we—not the public serve us? They just won't do it."

When asked what the retail clerks unions would think of night and Sunday work, Blees replied, "Union leaders are not sincere in saying they want to lower the cost of goods, then, if they won't conform to this public preference. As I see it we will all have to conform to what the public wants and adjust other things to it. I'll bet all the tea in China that five years from now all stores that have things to sell to a working public will be open nights."

A Challenging Opportunity

SEVERAL warnings and even samples of what may happen when the full productive capacity of this nation is freed of war requirements have been evident recently and these pose the question, "What is going to be done about it?" Isn't that question a challenge that business men should try to answer with a program, rather than let it become a political socialistic campaign? With the organizational skills and initiative found in men in the electrical industry, is this not a challenge and an opportunity?

Let's Have a Sequel

WE read a book the other day by Marquis Childs (*The Farmer Takes a Hand*—Doubleday) which needs a sequel. Mr. Childs takes as his thesis the fact that in the last 20 years the REA co-ops have done more to promote the welfare of the farmer than any other single thing. In singing the saga of rural electrification via government subsidy Mr. Childs overlooks one simple point: the rural electrification job on the Pacific Coast done by private utilities long before REAs were ever conceived. That's why we say Mr. Childs should write a sequel. His research for it would teach him much about farm electrification that his initial volume omits.

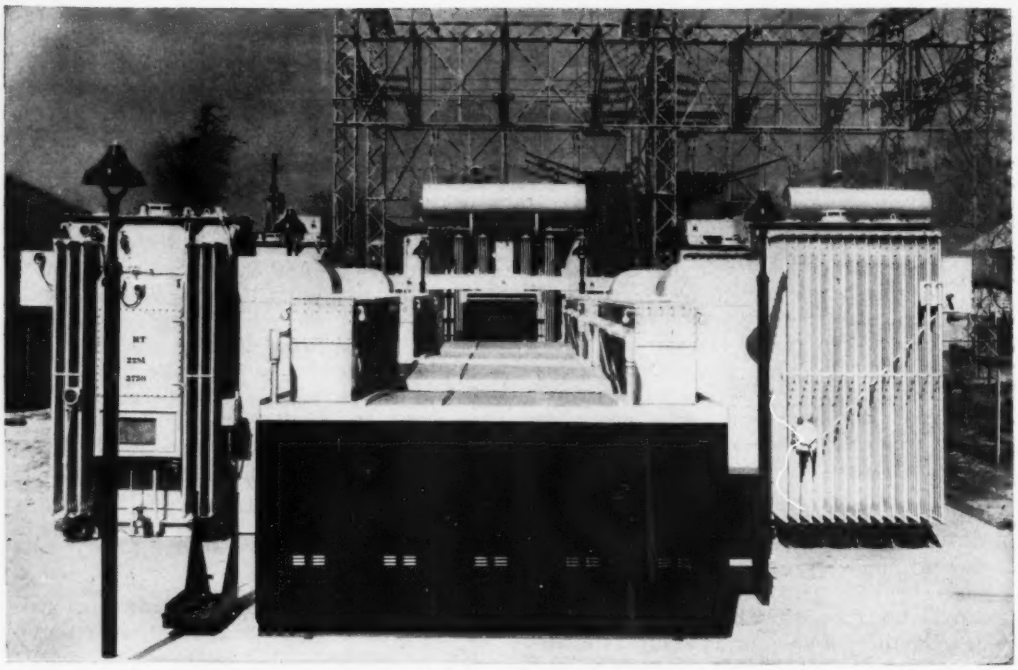
Which Way America?

EVERY man and woman privileged to hear Carl Taylor's down-to-earth simple, yet impassioned, analysis of the course America has pursued in the last 20 years in its leftward trend toward usurpation of the rights of individuals by the state, wished ardently that others too might hear and profit. To a degree this is now possible. ELECTRICAL WEST has transcribed Mr. Taylor's inspiring address from a tape recording and has condensed it into an article published in this issue. Reprints will be available. So too will the recording for those who wish to borrow it. Evéryone who reads or hears this address cannot help but appreciate what it means to be an American and to understand what must be done to protect the human rights and freedoms inherent in the word "American."

You Can Say That Again

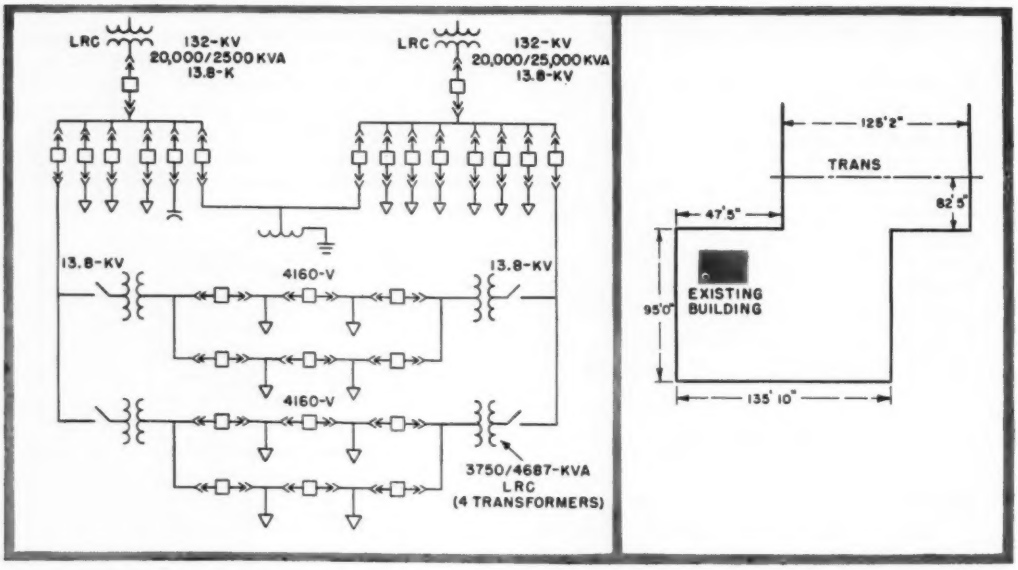
"... as I traveled hither
through the land,
"I find the people strangely
fantasied,
"Possess'd with rumours,
full of idle dreams,
"Not knowing what they
fear, but full of fear."

—William Shakespeare, "King John," Act IV, Scene II.

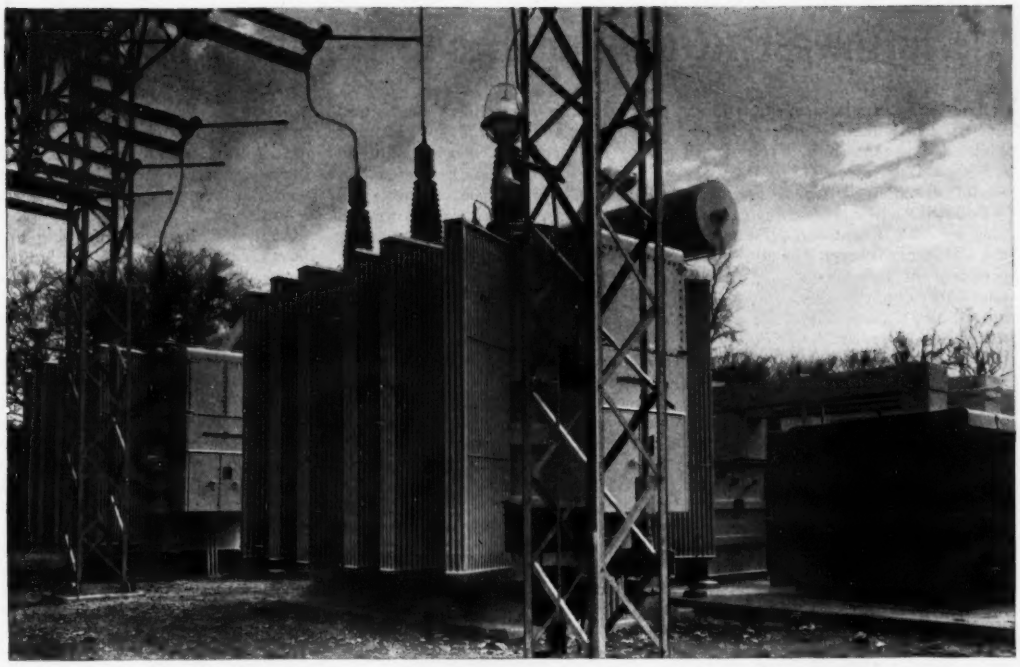


SAN ANTONIO'S 10TH STREET SUBSTATION, one of the largest built by General Electric, is rated at 40,000/50,000 kva, serves its area through nine outgoing 13,800-v feeder circuits in addition to eight 4160-v circuits fed from duplex units.

Utility just draws one-line diagram and



PLANS FOR UTILITY EXPANSION begin with these drawings. A one-line diagram, shown at left, and a simple plot-plan are all that G-E engineers needed to start work on big unit substation for San Antonio. Installation was completed in record time.



LOAD RATIO CONTROL in 25,000-kva transformers provides bus regulation for the 13,800-volt feeders, two of which feed double-duplex units. LRC in duplex units regulates each pair of 4160-v feeders. The substation supplies downtown San Antonio.

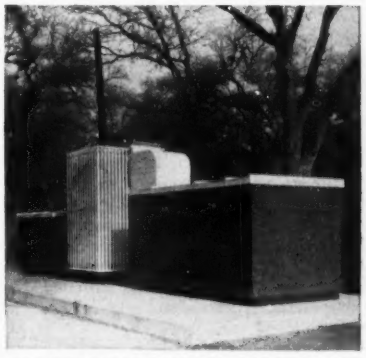
plot-plan to specify 50,000 kva substation

An example of fast, low-cost expansion with G-E unit substations.

The 10th Street substation in San Antonio was planned to feed the city's rapidly expanding system. The utility found it had only to furnish General Electric a simple plot-plan and one-line diagram—similar to those shown at the left—to get the job started fast.

Working from these drawings, General Electric easily and quickly provided a large, double-duplex master unit substation, rated at 40,000/50,000 kva. This standardized equipment answered space requirements as well as the needs of the utility's fast-growing loads.

The City Public Service Board's experience with this G-E substation is further evidence of the trend to standardized equipment in utility expansion programs. G-E unit substations, with their great flexibility, find application in a variety of system arrangements. For full information, write for Bulletins GEA-3800 and GEA-4500. *General Electric Company, Schenectady 5, New York.* 321-101



BRACKENRIDGE SUBSTATION: One of 30 similar substations installed on San Antonio's system. G-E equipment simplifies expansion.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Northwest Accounting Group Holds Conference

The Accounting and Business Practice Section of the Northwest Electric Light & Power Assn. met recently in Medford, Ore., with Frank Bash, California Oregon Power Co., as chairman.

Following a hearty welcome to Medford by A. S. Cummins, president of the California Oregon Power Co. and president of the association, the accounting conference immediately moved into a panel discussion of customer billing with Ralph Lawlor, Pacific Power & Light Co., and Henry Mann, Utah Power & Light Co., speaking on the use of equipment other than IBM, while Allan F. Elder, Washington Water Power Co., and Norman Woodbridge, B. C. Electric Co., told the IBM story. IBM users claimed that the training of operators presented no serious problem and that speed, accuracy, and costs were favorable, particularly when the equipment was used for other accounting and statistical work. It was also shown that other makes of equipment used for billing could likewise be used for additional work to increase the load factor on the machine.

An analysis of various companies' experience with and opinions on bimonthly billing by V. D. Jones, B. C. Electric Co., indicated that although economies could be effected, the disadvantages of increased bad debt losses, increased collection cost and creation of an adverse customer relations problem outweighed the advantages and kept most of the companies from going back to the system or adopting it. Puget Sound Power & Light Co., however, which has been on bimonthly billing for some time, reported a generally favorable experience.

Dick Schatz, Washington Water Power Co., reported that in a survey of the companies' credit and collection policies, it was found that the ratio of net losses to gross revenue in 1951 ranged from .32% down to .074%, with the average at .15%. Companies have generally stiffened their credit requirements and collection policies.

A questionnaire, which outlined customers' accounting and collecting procedures and costs, was reviewed by Ralph W. Lawlor, Pacific Power & Light Co. Net costs per customer in the different companies were, for the most part, well under five dollars. All companies are now on central billing, though there is considerable variation in machines and procedures used.

Procedures in storing, issuing and accounting for materials and supplies were revealed in a questionnaire on this subject and reported by Floyd Watkins, California Oregon Power Co. There appeared to be a trend toward increasing use of mechanized handling of equipment in warehouses. Discussion centered largely around salvaging and reconditioning of certain classes of equipment.

Henry Mann, Utah Power & Light Co., explained the use of preprinted material issue and return forms, which it was claimed simplified the charges and credits of the principal items of materials.

Innovations in procedures, reported since last year's conference, included billing economies, means of saving time in signing checks, allowing meter readers to take vacation at the same time of the year and estimating bills for that month, establishment of stenographic pools, and installing a system for receiving dictation over the telephone lines in the central stenographic pool. These and many others were tabulated by Ellis Andersen, Idaho Power Co.

In the analysis of the companies' depreciation practices, as reported by E. C. Alford, Portland General Electric Co., it was found that segregation of the reserve by classes of property had been started or completed in eight of the companies. Five of them were segregating by functional groups and three by plant account. Those who are segregating believe that the more you break down the depreciation item, the less margin of error you will be likely to have in the total.

Discussing "Some Practical Aspects of Depreciation Accounting," Arthur H. Kuhn, Pioneer Service and Engineering Co., defined "depreciation," as he was discussing it, as the recorded cost of depreciable plant less net salvage, as distinguished from another meaning of the word indicating the loss in value of property not restored by current maintenance. He stated that it was the general consensus today that the average service life of plant was perhaps twice what the average service life was considered to be 40 years ago.

Use of clearing accounts was reported by Carl Schoeggl, Puget Sound Power & Light Co. Principal discussion was on administrative costs charged against construction. Some companies use a clearing account for charges that cannot be charged directly to a job, clearing this to the proper construction account at the end of the accounting period, while other companies capitalize no overhead that cannot be directly tagged to some job.

Analyzing the effect of going to a biweekly pay roll in the Washington Water Power Co., R. P. Moller of that company showed that the plan had both advantages and disadvantages, with the latter probably outweighing the former. Experience with it, as of today, however, is too short to be conclusive.

Discussion of equipment rentals by H. D. Rohrbach, Mountain States Power Co., centered chiefly around contracts for the joint use of poles, in which there is a rather wide diversity among member companies.

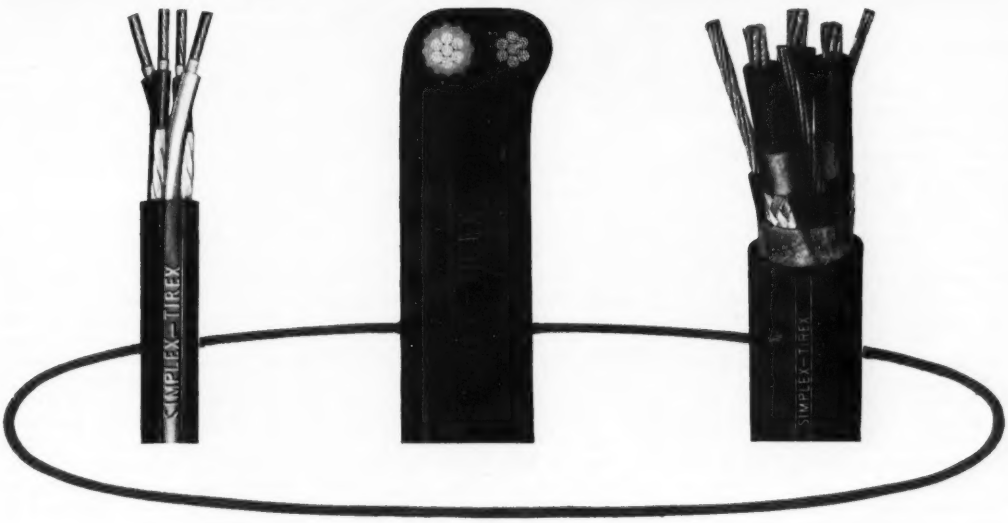
At the luncheon, winding up the sessions, E. H. Johnsmeyer, Idaho Power Co., told the story of the Hells Canyon controversy between the company and the Bureau of Reclamation as to who should develop power in the Hells Canyon section of the Snake River.

Electric Clubs

William Brainard, Cannon Electric Co., was named president of the East Bay Electric Club, Oakland, to succeed Walter D. Howell, PG and E division sales manager, who has served as president during 1951-52. Ted Gerlishe, consulting electrical engineer, was elected vice-president; Frank Gadsby, Ets-Hokin & Galvan, secretary-treasurer; and Ray Giles, Pacific Coast Engineering Co., Mark Wilkins, Graybar Electric Co., and Scott Beamer, consulting engineer, as directors.

Ivan L. Bateman, assistant chief electrical engineer of the Los Angeles Department of Water & Power, has been elected president of the Electric Club of Los Angeles, succeeding J. L. Tindale of the Anaconda Wire & Cable Co. Other new officers are: first vice-president, R. G. Kenyon, vice-president, Southern California Edison Co.; second vice-president, R. E. Johnson, manager, industrial division, General Electric Co.; third vice-president, Carlisle Bailey, executive vice-president, Newbery Electric Corp.; secretary-treasurer, Stanley M. Johns, Los Angeles manager for Westinghouse Electric Corp.; sergeant at arms, R. D. Moody, district manager, Allis-Chalmers Mfg. Co.

TIREX IS A FAMILY



To a great many people the name "TIREX" means a small, flexible, long-wearing portable cord. Actually, TIREX is the name of a family of portable cords and cables. The family ranges in size from a single conductor #18 cord, all the way up to a 3-conductor Type SH-D cable for voltages in excess of 10,000 V.W.P.

TIREX cords are made in sizes from 18 to 10, from single to eight conductors in Type SO, and from two to four conductors in Type SJO. There are TIREX Mine Cords, as well as heavy duty shielded cords.

In the cable field there are single and multi-conductor cables, shielded or unshielded, Types W or G, SH-A, SH-B, SH-C and SH-D.

Your local distributor has many of the TIREX cords and some of the TIREX cables in stock. He can get most of the other stock type TIREX cords and cables for you in a comparatively short time. Be sure to see your local distributor whenever you need portable cords and cables.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX-TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

NISA

William M. Hogue of Larson-Hogue Electric Co. in Los Angeles was elected vice-president of National Industrial Service Assn. at its recent annual meeting in Chicago. He has been on the directorate for the past few years and active both at the national association and in the Los Angeles Chapter.

EMEA

With several exceptionally high quality programs in the last three or four months, the Electrical Maintenance Engineers Assn. of Southern California recessed with a tour of the McCulloch Motors plant as its August goal and was planning its annual Bosses' Night with the G-E House of Magic as its Sept. 17 feature. Its July 16 meeting went round and round with a forum panel of experts answering questions about variable-speed drives, with Project Engineer Robert Milmoe of Bechtel Corp. as speaker and moderator. On the panel were W. S. Badt of American Blower Co.; A. J. Garey, U. S. Electrical Motors; R. I. Greenwood, Westinghouse; K. D. Harrington, Cutler-Hammer; W. C. King and Bob Kline of Electric Machinery Mfg. Co.: Howard Latta, Reliance Electric & Eng. Co.

The June meeting was the annual joint meeting with the Illuminating Engineering Society, Southern California Section, and Foster K. Sampson, member of both, gave an exceptionally practical and realistic talk on selection and maintenance of lighting equipment. At the previous meeting, Nels Swanson, Swanson Engineering Co., did a similar thorough job on process control instrumentation, covering not only theory but practical applications and limitations. And at the previous meeting another insight into maintenance problems was given from the utility standpoint by Carroll Cole of the Los Angeles Department of Water & Power. A member of the customer's equipment service unit of the utility, Cole has had opportunity to see and diagnose many customer difficulties with electrical equipment.

IES

A proposal that a new **Rocky Mountain Region** be established for the area now split between the South Pacific Region and the Midwest Region —in other words the Rocky Mountain Section in Denver, the Utah Chapter in Salt Lake City, and the two newly chartered chapters in Pueblo and in Albuquerque—has met with favorable response by all concerned and may soon become an actuality. The **Utah Chapter** at its election passed favorably on it as did the Rocky Mountain Section in Denver. Dean Jenks, General Electric Lamp Department, was elected chairman; Darcie H. White, Utah Power & Light Co., secretary-treasurer; Allen B. Rudy and George Earl, UP&L, and Philip W. Smith, Westinghouse, board of managers. The last two meetings of the chapter had E. S. Smyth of Rohm & Haas, San Francisco, speak on Plexiglas for fixtures and luminous ceilings, and a visit to the garden of William F. Langton, who spoke on "Effective Garden Lighting."

Northern California Section concluded its meetings before summer recess with a visit to the U. S. Naval Shipyard at Hunters Point on San Francisco Bay and before that had Elizabeth Banning, color consultant, and L. H. Markwood of W. P. Fuller & Co. speak on "Modern Color Trends."

Southern California Section presented awards to the winners of its **Most Interesting Lighting Job** contest, held at its May meeting, at the joint meeting June 18 with the Electrical Maintenance Engineers. (See EMEA.) First prize went to R. E. Bevin, Southern California Edison Co., second to R. L. Ford, same company; and third to Carlton M. Thompson, San Diego Gas & Electric Co. Bevin's entry will be entered in the national competition in Chicago at the IES Technical Conference, Sept. 8-11.

Leonard A. Hobbs, vice-president of Smoot-Holman Co., Inglewood, was elected to succeed Carl Martin of Benjamin Electric Mfg. Co., San Francisco, as vice-president of the South Pacific Region of IES and W. J. Lind, manager, lamp and lighting division, Canadian General Electric Co., Vancouver, to succeed Kenneth Hollingsworth, Puget Sound Power & Light Co., as vice-president of the Pacific Northwest Region, at the annual ballot of the IES just completed.

Inspectors

Preliminary programs of both the Northwestern and Southwestern Sections, International Association of Electrical Inspectors, annual meetings at Twin Falls, Sept. 11-13, Fresno Sept. 18-20, respectively, show a great deal of time for code discussion to review the changes that have been proposed for the next edition of the National Electrical Code and a few speakers presenting subjects pertinent to codes and wiring methods. President of IAEI this year is Chester Kirsop of Olympia, Wash., long prominent in the Northwestern Section and a past president of it. The Twin Falls arrangements are in the hands of Ralph Foley, Idaho Power Co., Twin Falls, who heads an Idaho Chapter committee.

For the Southwestern Section meeting at Fresno, the local arrangements committee is headed by Ray E. Colby as general chairman and has on it George Hayden, Vern Jones, L. B. Sterling, Clyde Smith, J. B. Harvey, Lee Smith, John Helms, W. V. Worthington, W. E. Ochinero, J. K. Mursch and T. W. McCloskey. Vern Jones at PG and E is handling hotel reservations.

Idaho Chapter officers elected at the recent annual meeting have been announced as follows: Floyd Warner, Lighthouse, Kellogg, chairman; H. L. Baker, state inspector, Lewiston, vice-chairman, district 1; Clyde Hicks, Nampa inspector, district 2; Harry Smock, Twin Falls inspector, district 3; Hy Hansen, Idaho Falls inspector, district 4; Rankin C. Young, state inspector, Boise, secretary-treasurer; Ralph Foley, C. Jensen, B. J. Oenning, executive committee.

Puget Sound Chapter was honored with visitors from the **Electrical Inspectors Assn. of B. C.** when it had its last meeting at Bellingham, Wash. L. Robson, chief inspector for the Providence of British Columbia, J. R. Walker of B. C. Electric, and Philip Rive, Vancouver inspector, attended and exchanged ideas and views over code matters. Next meeting of the chapter is to be in Seattle, Aug. 23.

At the British Columbia association meeting in June, Robson had made a report on changes being considered in the Canadian Electrical Code and on a meeting he had attended at the Canadian Standards Approval Council. Proofs of the code edition are to be available in September so that Canadian inspectors can study and comment upon it before a sixth edition is published next year. Some consideration was also given to affiliation with the IAEI as part of a Canadian Section but no action was taken, individual memberships being recommended at present.

Northern California Chapter voted its opposition to any abbreviated edition of the National Electrical Code as wanted by the Pacific Building Officials Conference, maintaining that no town of any size exists without need to refer to the full code for many applications. O. G. Wedekind of Underwriters' Laboratories received

FOR APPEARANCE AND PERFORMANCE

SQUARE D's NEW REVERSING DRUM SWITCH

DESIGN LEADERSHIP FEATURES

Compact Size • Large Screw type Terminals • Replaceable Terminal Blocks • Convertible from Maintained Position to Spring Return • Positive Shock-proof Indexing • Single Captive Cover Screw • Generous Wiring Space • Two ½" Conduit Openings at Bottom • Front or Rear Handle Operation • Large and Legible Nameplate • Modern Streamlined Styling

This Class 2601 Reversing Drum Switch is a "natural" wherever the direction of rotation of a small motor is to be manually controlled. It can be used with single phase, polyphase and D. C. motors.

Bulletin 2601-A gives complete details

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When System Growth
Demands Additional Substations,
Install Allis-Chalmers Unit Subs.
They are Simple to Specify,
Time-Saving to Install and Easy to Expand
for Future Needs.

WHEN LOAD GROWTH MEANS EXPANSION . . . add substations designed to do more than just meet your immediate needs — add Allis-Chalmers Unit Substations with built-in flexibility for the future.

Then when future residential or industrial growth necessitates additional feeders, they will be easy to add. Each feeder of an Allis-Chalmers Substation is a complete unit in itself and is easy to install.

Here's How Feeders Are Added

Remove the bolted-on plates that cover the pre-cut bus and wiring openings . . . also remove the roof splice plate from the end feeder. Now bring the new feeder into position. You'll find correct alignment is easy, insured by jig-built construction. Replacing the gasketed roof-splicing plate completes mechanical connections.

Electrical connections are also simple to make. The predrilled, silver-plated bus extensions are bolted together. Easy-to-apply no-corona tape and insulating tape finish the joint. There's no compound to melt, chip, scrape, or crack. Control wiring is easy to connect because terminal blocks are grouped . . . located for ready access.

That's it! Connect feeder cables and the job is done.

MCS Unit Substations are a convenient answer to the growing distribution problem . . . to the ever increasing demand for power and yet more power. They are simple to specify, neat and modern in appearance, easy to expand, and they save you money these five ways:

(1) Original equipment cost is low; (2) compact construction reduces space requirements and real estate costs; (3) pre-wired unit design speeds installation; (4) maintenance is quick and economical because of improved accessibility, and (5) you purchase only the feeders you need *now*, deferring additional expenses until load growth demands them.

For the full story on what Allis-Chalmers Unit Substations can mean in your distribution system, call your nearby A-C representative, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3544

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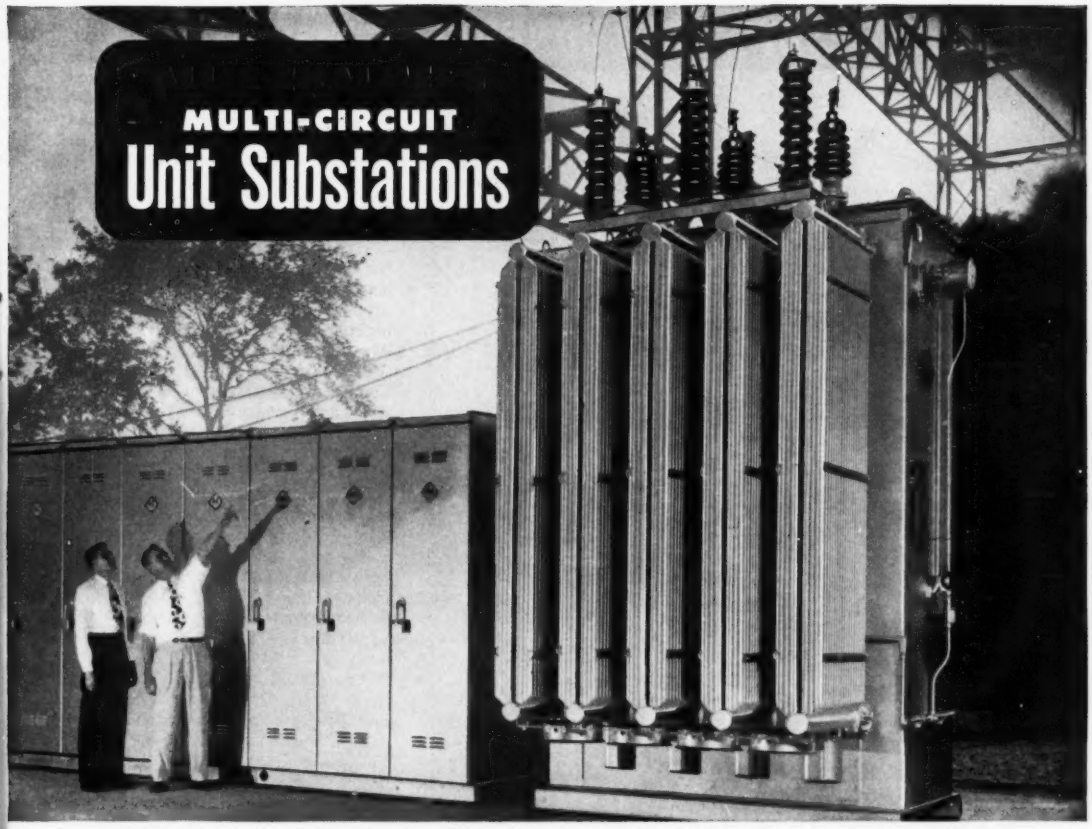
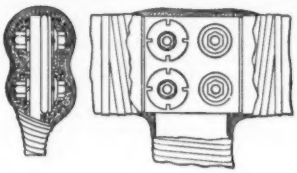
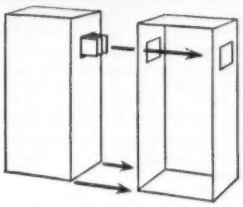


Here's Why Feeders are Easy to Add...

1 **FEEDER UNITS** are jig-built so that each feeder cubicle is exactly like every other one. Bus extension openings, control wiring openings . . . even small screw holes . . . are pre-cut in jigs. This careful, uniform construction makes field assembly easy. Just move the new feeders into position. Alignment is perfect.



2 **BUS JOINTS** are easy-to-make in the field. Bus extensions are pre-drilled and silver-plated . . . designed for quick, easy bolting together. No-corona tape covers the bolted joint . . . speeds the job by providing a smooth taping surface. Insulating tape finishes the joint. There's no compound to melt or apply.



3 **EACH FEEDER** is an individual unit . . . complete with two side panels, roof and floor. All enclosed parts are protected from the weather, dust or mechanical injury even during the last minutes of installation. Gasketed roof-splicing pieces fit easily into place forming a weatherproof seal.

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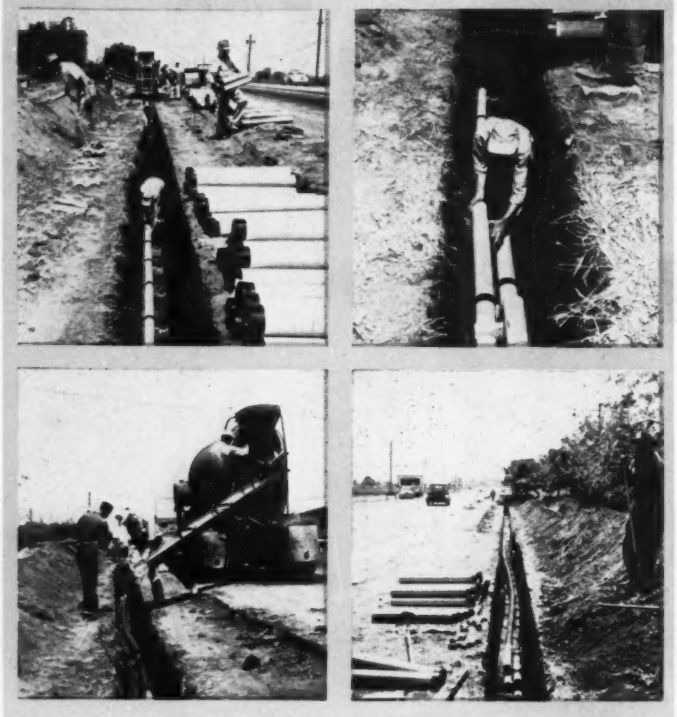

How an Underground Duct System is Built

These four pictures show stages of construction on a recent underground job. At upper left, trencher is digging 18″ trench, 6 feet deep. In foreground, base spacers have been set up and base layer of duct is started. Upper right, the 5-high tier of 3½″ duct is built up easily by one man. Bottom left, concrete envelope is poured around completed section. Lower right, scraper back-fills finished section. Duct ends in foreground will be tied into man-hole before final pouring. Sweep has been made to avoid another underground service encountered during digging.

The engineers who planned this job specified SOAPSTONE conduit because of its unequaled electrical and chemical characteristics combined with low first cost. The contractor enjoyed further savings because the SOAPSTONE was delivered right to trench-side and because the simple coupling, convenient length and accurate spacers speeded laying.

It will pay you to investigate the ways in which SOAPSTONE can speed installation and lower costs on underground duct systems whether large or small.

For prices and detailed information contact:

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PERMANENT CIRCUIT PROTECTION

endorsement of an idea to label sections of dead-front switchboards and number them as a guide to inspectors when finally assembled. They asked that the ampere rating of the bus bars be also on the name plate. Harold Gerber spoke on the applications of 277-v fluorescent lighting circuits.

AIEE

With Phoenix as its hospitable host, the Pacific General Meeting of **American Institute of Electrical Engineers** promises an entertaining as well as highly instructive four-day session, Aug. 19-22, at Westward Ho Hotel. A full program of Western and national speakers will cover transmission and distribution, electronics, chemical industry, safety, mining, transformers, metering and relaying, feedback control systems, industrial power, microwave, system engineering, engineer shortage, power generation and illumination. J. E. Redmond is Phoenix general chairman. President D. A. Quarles and 8th district vice-president, N. M. Lovell, and H. B. Sargent, president of Arizona Public Service Co., will speak on the first day's program.

Jesse D. Frantz, Pacific Power & Light Co., Portland, was elected president of the **Portland Chapter, AIEE**; Darrell A. Riechel, Pacific Telephone & Telegraph Co., vice-president; Franz J. Maas, Bonneville Power Administration, secretary.

Lloyd J. Hudlow, Bureau of Reclamation, Boulder Canyon project, is the new chairman of the **Boulder City subsection** of AIEE; Frank G. Scussel, vice-chairman; Clarence F. Neumann, secretary-treasurer; G. L. Barneby, membership chairman, and D. D. Dutter, member at large.

APDA

W. E. Montgomery, operating engineer, Southern California Edison Co., told the American Power Dispatchers Assn. for the southwest area at its July 11 meeting, San Gabriel, of the system interconnections in the Pacific Southwest Power Pool. D. P. Bengtsson, area chairman, presided.

CEE

A new organization, the **Consulting Electrical Engineers** of Southern California, met in June in Los Angeles to hear Donald F. Shugart speak on the efforts of the engineering profession to protect its interests at Sacramento. Ralph Crump, University of California, was another speaker.

Facts from MONTANA

"'CSP' Transformers cut failures 50 to 1"

"We have been using 'CSP' Transformers for the past ten years," says a Montana Utility. "One of our divisions now has about 1,000 'CSP' Transformers in service, and an equal number of the conventional type.

"Of all our 'CSP' Transformers, we have lost but one from lightning. During this 10-year period, we have been losing an average of five conventional transformers per year. That means a ratio of approximately 50 to 1 in favor of the 'CSP'."

Old standards for judging transformers were discarded when the "CSP" (Completely Self-Protecting) Transformer was introduced. The "CSP" Transformer, with both lightning and thermal protection built in, has slashed costs, cut maintenance, and improved service continuity. Its reputation has been won by performance in the field, in instances like this one—records that have made it first choice with utilities coast to coast.

Installation and maintenance costs for Westinghouse "CSP" Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies developed the National Averages shown at left.

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.003%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

"CSP" devices . . . originated and patented by Westinghouse

Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

J-70591-A

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

THE MONTH IN BRIEF

Oregon Commission Rejects Pelton Application

Although FPC granted a license for Pelton Dam last December, the Oregon State Hydroelectric Commission has turned down Portland General Electric's request for a state permit for the Deschutes River project. FPC claims jurisdiction on grounds that the proposed site is on federal land but Oregon law provides that no dams shall be built on state streams without approval of the fish and hydroelectric commissions. Pending decision on the state's appeal from FPC's ruling in the U. S. Circuit Court of Appeals, the power company has held up construction of Pelton and further plans on its Round Butte project upstream, for which it has a preliminary FPC permit. In denying a state permit, the hydro commission found that the dam would eliminate salmon runs above it and end plans for building up present salmon runs in the Deschutes to replace spawning grounds lost through federal dams on the upper Columbia.

Condemnation Trial Legal, Judge Rules

Washington Water Power's request for dismissal of a PUD condemnation suit brought against its Chelan County properties has been denied by Superior Court Judge Fred Kemp at Wenatchee, Wash. The company claimed the Chelan County PUD had not brought action to trial within the time required by law. Judge Kemp, however, upheld the PUD contention that the company's claim was waived by a stipulation entered into by both parties that no trial date be set before Sept. 1, 1951.

Supreme Court Finds for PUD

Reversing a lower court, the Washington State Supreme Court has ruled that the Pend Oreille PUD of Newport, Wash., has authority to build its proposed $17,541,000 Box Canyon Dam on the Pend Oreille River near the Canadian border. The superior court earlier had ruled that the PUD lacked authority, since it initially can use only 15 to 18% of the 50,000 kw the project will produce. Balance of the power is to be sold outside the district. The supreme court also ruled that a proposed bond issue to finance construction of the dam would be legal. FPC approved the dam last February and the RFC agreed in March to lend $17,-541,000 to finance it. The PUD has awarded a construction contract, contingent upon court approval of the project, and equipment bids have been received, it is reported.

High Court Studying Tax Case

The Washington State Supreme Court has taken under advisement General Electric Co.'s petition to recover some $1,250,000 paid to the state in business and occupation taxes on its Hanford Works operation for AEC. G-E holds that the atomic energy act exempts the company from payment of the taxes but the state holds that only the federal government is exempt, not the contractor for the government.

City Files Claim Against PUD

Port Angeles, Wash., city council has authorized a $162,952 claim against the Clallam County PUD and is considering the request of City Manager G. S. Vergeer for authority to terminate the city's contract with the PUD by Oct. 1. The contract, signed in 1944, has four more years to run. According to Vergeer, the PUD has been selling Bonneville power to the city since 1949 but has never given the "reasonable rate reduction" agreed upon at signing of the contract in event BPA power were available.

Cowlitz Case Under Advisement

Superior Court Judge Charles T. Wright at Olympia, Wash., has taken under advisement a case brought by the city of Tacoma attacking legality of the state's lower Columbia River fish sanctuary. The sanctuary prevents Tacoma from building its two Cowlitz River dams, for which it has an FPC license. E. K. Murray, Tacoma attorney, contended in a recent hearing that the law establishing the sanctuary is illegal and that, where federal and state laws concern the same subject, federal laws take precedence.

Northwest Projects Approved by Congress

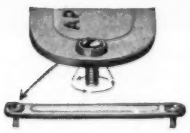
About 70% of the Pacific Northwest power developments proposed by federal agencies won approval from the Congress now in recess. Funds were asked for projects to provide 5,000,000 kw of new power by 1960, with appropriations granted for continuation of work on ones that will develop about 3,500,000 kw when completed. Ice Harbor and Hells Canyon Dams on the Snake River failed to secure approval. Major hydroelectric projects receiving approval were: McNary Dam, $63 million; The Dalles, $20 million; Chief Joseph, $15 million, and Albeni Falls, $7 million.

Nevada May Get Central Valley Power

A contract that would make Central Valley power available to the Colorado River Commission of Nevada has been submitted to the Secretary of the Interior and the commission by USBR. Richard L. Boke, director of USBR's region 2, said that the original Nevada request for 150,000 kw was out of the question because of demand by other public agencies. The contract submitted includes a provision that Nevada must show by June 1, 1953, that it has made satisfactory arrangements for transmitting and firming CVP power. The Nevada commission will resell the power to defense plants and preference customers.

No lost screws, No scuffed fingers, No lost time!

USE APPLETON LOKT-SCREW COVERS FOR FORM 35 UNILETS



New "Ball-and-Socket" Action Screws!

End view of time-saving "Lokt-Screw" cover shows rocking action of "Ball-and-socket" type screws, permitting one side of cover to be completely tightened before tightening of second screw begins. Screws are held permanently in place by steel of the cover itself!

New Appleton **LOKT•SCREW** covers offer time and trouble saving advantages you find in no other conduit fitting cover—and you get them at no extra cost!

Precision-threaded, easy-turning screws on Appleton **LOKT•SCREW** covers are held permanently in place by steel collars which completely surround screws, a feature which also prevents finger-bruising screw-driver slippage.

The Appleton **LOKT•SCREW** cover is only one of hundreds of Appleton wiring devices expressly designed to bring greater speed and convenience to every job. For highest quality fittings to meet every wiring requirement, specify Appleton—The Standard for Better Wiring.

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APPLETON ELECTRIC PRODUCTS

Gruelling tests prove that

Rome • EMT is welded

The accompanying unretouched photographs show the results of the most punishing tests ever inflicted upon an electrical metallic tubing. Note that Rome • EMT has been compressed, flattened, flared and expanded—*yet the weld holds as firm as the metal itself* . . . further proof of the superior quality of this lightweight steel raceway.

Such "built-in" precision welding is only one of many important structural advantages you get with Rome • EMT. Light in weight and easy to bend, it assures fast, economical installation. Simple compression type fittings eliminate thread cutting and permit rapid, moisture-tight connections. A mirror-smooth interior surface makes wire pulling easy. And its electrogalvanized exterior affords utmost protection against corrosion and abrasion.

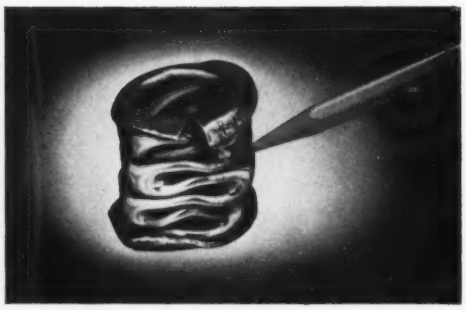
Underwriters' approved, Rome • EMT exceeds all standards for thin wall raceways. Ample stocks are now available in the following sizes:

STRAIGHT LENGTHS—½", ¾", 1", 1¼", 1½" and 2".

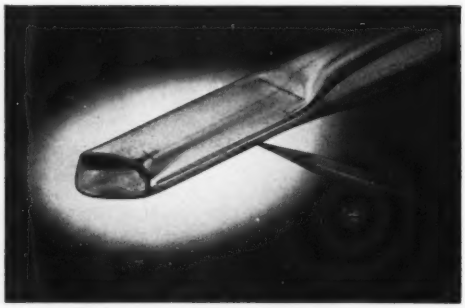
90° ELBOWS—¾", 1", 1¼", 1½" and 2".

Warehouse stocks located as follows:

Chicago, Ill.	San Francisco, Calif.
Dallas, Texas	Seattle, Wash.
Denver, Colo.	St. Paul, Minn.
Los Angeles, Calif.	Torrance, Calif.
Salt Lake City, Utah	



SQUEEZED like an accordion by tons of pressure—yet the Rome • EMT weld holds firm . . . proving the weld to be as strong as the tube walls themselves.



FLATTENED like a pancake—actually creased along the weld. But look at the weld itself. It remains unbroken and as good as ever.

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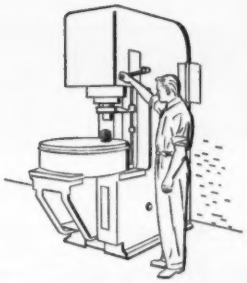
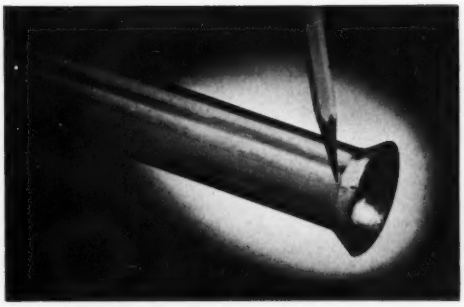
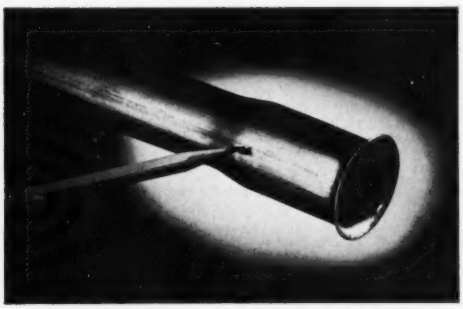
Forever!





FLARED while cold during a cone test. And note the weld. There's not a single indication of a break.



EXPANDED 25% and flared. If weld weakness existed, this test would surely find it. Yet look at it —strong as ever . . . proof positive of Rome • EMT's superiority.

The Rome • EMT used in these tests is 1" in diameter, .049" in wall thickness.

For unexcelled wire and cable performance:

ReFlex ReMarine ReBarn RePrene®
ReZone® Rome Synthinol® ReLene

Test it yourself!

Get a Free Sample of Rome • EMT

Rome is anxious for you to actually see EMT—to feel its light weight, its mirror-smooth surface—to test its weld yourself . . . and compare it with any other lightweight metallic conduit on the market today. For your free sample, please write us on your company letterhead. Address Rome Cable Corporation, Rome, N. Y.

THIS MONTH'S NEWS

Power Company Studying Lewis River Dam Sites

Applications for preliminary permits for two hydroelectric sites on the Lewis River in southwestern Washington above the Merwin and Yale developments have been filed with FPC by Pacific Power & Light Co. The two have an estimated 85,000-kw power potential.

Tentative plans call for a 50,000-kw installation at Swift Creek and a 35,000-kw development at Muddy River, about 12 miles farther upstream. The $30 million Yale project, scheduled to begin operation in November, will have an initial installation of 108,000 kw. Merwin plant, first PP&L development on the Lewis, has a present capacity of 100,000 kw.

If the new up-river developments prove to be feasible, the additional storage will increase firm power output of both Merwin and Yale plants, according to Paul B. McKee, PP&L president. Each of these developments is designed to take two more generators and full development of the present and proposed plants would give the company a total of 501,000 kw of peak load operating capacity on the Lewis, approximately the equivalent of a Bonneville Dam.

Actual timing of the various steps will depend upon their economic feasibility, McKee said. Detailed investigations of the Swift and Muddy sites will cost roughly $50,000 each.

As a possible alternate to the Swift Creek site, which is just above the Yale reservoir, the company expects also to investigate the feasibility of a higher dam at Big Bottom, a short distance upstream.

The permit applications tentatively propose a rock-fill dam 225 ft high at the Swift Creek site, with an 18,000-ft tunnel dropping water to a downstream power house. Two 25,000-kw generators would be installed in the plant.

A 200-ft dam of similar construction at the Muddy River site would divert water into a 16,000-ft tunnel, with the power house at the head of the Swift reservoir. Here would be installed two 17,500-kw units.

With the proposed new dams in service, about 43 miles of the Lewis River would be fully developed for power production.

From the Muddy River site to Merwin, the Lewis River would drop a total of 1,150 ft through the series of turbines to generate power for the region.

With completion of the Yale project this fall, Pacific Power & Light will have a total installed generating capacity of 285,000 kw.

Including the Yale project, the company's postwar construction expenditures total more than $75 million.

Telluride Power Is Given Twenty-Five-Year Franchise

City of Richfield, Utah, has given Telluride Power Co. a 25-year franchise to replace a franchise agreement that would have expired on Dec. 31, 1953. In announcing the action, Mayor J. N. Stacey said that city officials had studied the local power situation thoroughly, considering possibility of a municipally owned system, and decided that the private power company was in a position "to better furnish electric power at lower cost than any other plan would allow."

System-Wide Strike Voted By Electrical Workers

A strike against Pacific Gas and Electric Co. on or after Sept. 1 has been voted by more than 6,000 members of AFL's IBEW local 1245. The system-wide strike was voted to back demands for a 20c-per-hour pay raise and improved pension plan. The local has rejected a company offer of a 4.6% raise. Negotiations are continuing.

● **Okanogan County** (Wash.) **PUD** may buy lines and facilities within its county owned by Ferry County PUD of Republic. Purchase could be financed in part with $152,497 received from BPA for a 115-kv line between Omak and Tonasket. Because Ferry County PUD is in debt to Nespelem REA, it must get that group's approval before selling.

Snake Project Will Get Washington Hearing

Idaho Power Co.'s application for a license for its proposed Oxbow hydro plant on the Snake River will be given an FPC hearing in Washing, D. C., on Nov. 17. The date was agreed upon by opposing attorneys following preliminary testimony at Baker, Ore., and Boise, Idaho, hearings conducted by William J. Costello, FPC examiner.

The 140,000-kw project, for which preliminary permit was issued in June 1947, would be flooded by the USBR's proposed Hells Canyon Dam.

The Oxbow plant would be the first of five low-head dams, which Idaho Power would build at a cost of $134 million to generate 714,000 kw. The high-level (740 ft) Hells Canyon Dam would cost an estimated $356,810,000 and produce 688,000 kw of prime power.

Hearings on the company's application were requested by Secretary of the Interior Oscar Chapman. Since the company formally requested the license in 1950, the question of private vs public development of the site has been discussed by many Northwest groups.

Idaho Power spokesmen stress the facts that private construction would represent a source of tax revenue and that irrigation water rights are protected in the company filing while the USBR's Hells Canyon project would jeopardize the availability of Snake River water for farming.

Public power proponents point out that a low-head dam would eliminate future consideration of the Hells Canyon development, which they assert is necessary for full development of all available resources in the area. They also contend that Hells Canyon would be an asset to the Northwest Power Pool by firming downstream flow.

● **Seattle City Light** has asked city council approval of a $4.5 million substation for the Duwamish industrial district. It would consist of a 230-kv receiving station with two 75,000-kw transformer banks and would require construction of a double-circuit 230-kv line 2.4 miles long.

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oils

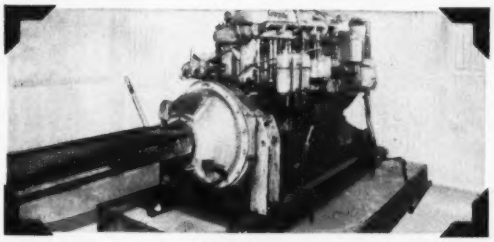
UNIT Caterpillar D13000 diesel

CONDITIONS Constant load

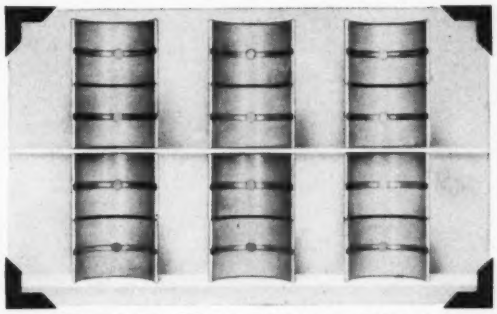
PERIOD 7650 hours

FIRM Dean H. Thayer, Mesa, Ariz.

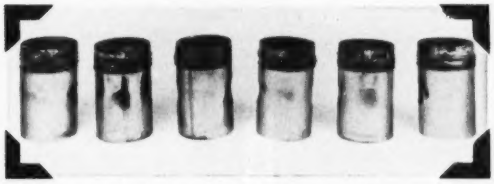
Only 0.001" bearing wear in 7650 hours of work!



WORKING UNDER A CONSTANT LOAD pumping water, this D13000 diesel on the Dean H. Thayer ranch, Mesa, Arizona, ran 7650 hours before it was overhauled. An emergency made it necessary to run the engine for several days without safety cut-offs. Severe over-heating caused the governor to stick and the unattended engine reached a speed of approx. 1800 r.p.m. before it could be shut down.



OPERATED ON RPM DELO Supercharged-2 Lubricating Oil during the 7650 hours, con rod bearings showed only 0.001" greatest wear. There was no pitting and all parts were unusually clean.



NO MEASURABLE WEAR was evident on the pistons which showed original tool marks. Greatest wear on liners was 0.005. Piston rings were all free, oil rings were open. After inspection, main bearings, crankshaft, cam & cam bearings, piston pins and bushings were all put back in service.

REMARKS: This engine operates year 'round in widely varying temperatures. In wintertime, the irrigation water is used to prevent the crops from freezing.

There is an RPM DELO Oil to meet every heavy-duty engine operation condition. FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.

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How RPM DELO Oils keep engines clean and prevent wear

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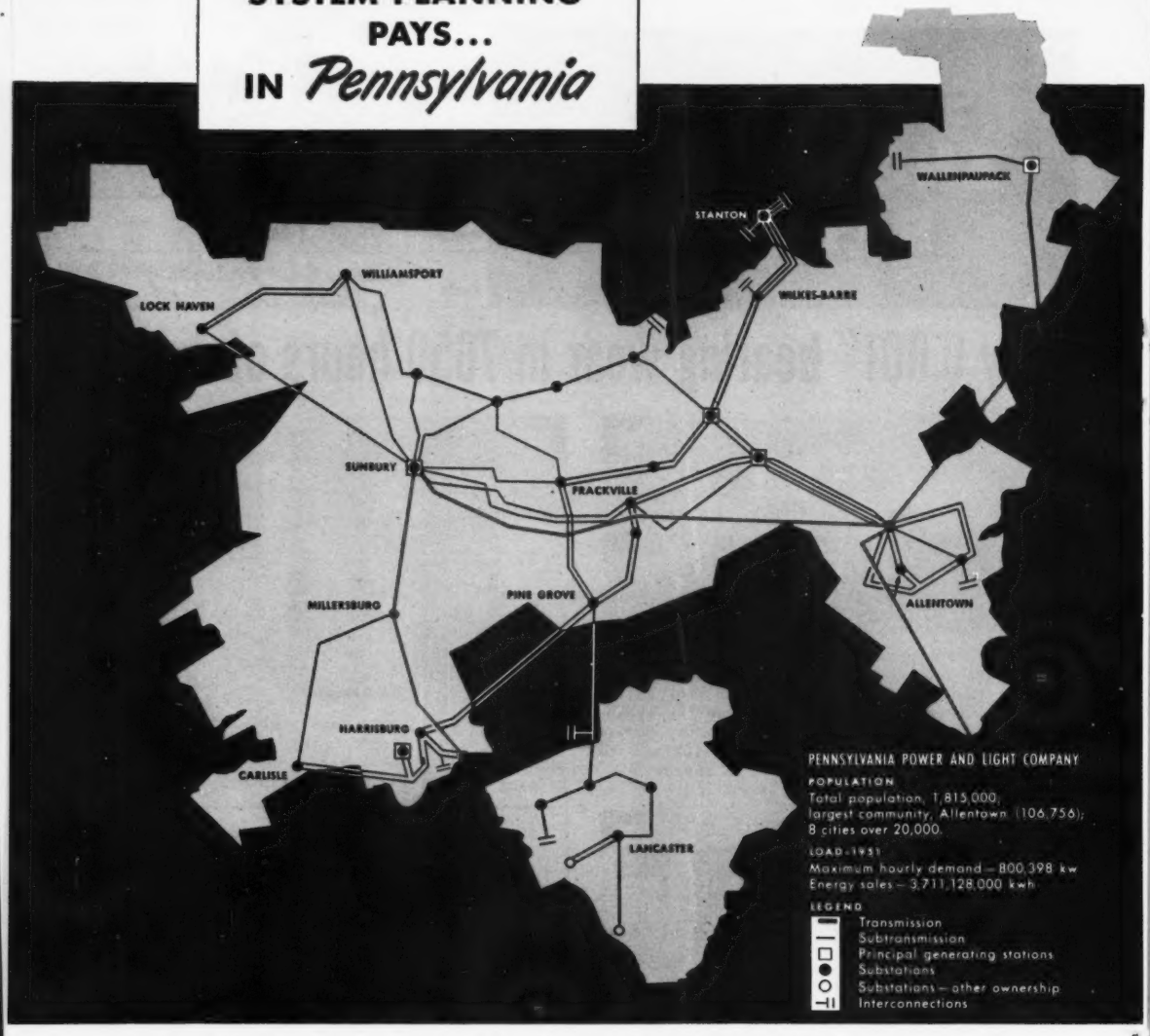
B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.

C. Special compounds stop corrosion of any bearing metal, and oil foaming in both wet and dry sump engines.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

SYSTEM PLANNING PAYS... IN *Pennsylvania*



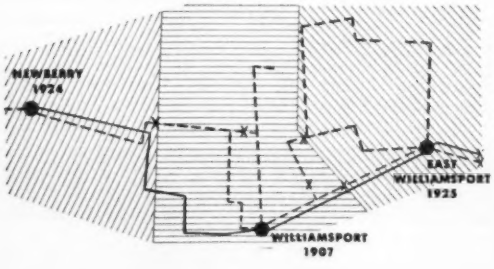
HOW THEY MET LOAD GROWTH AT WILLIAMSPORT...

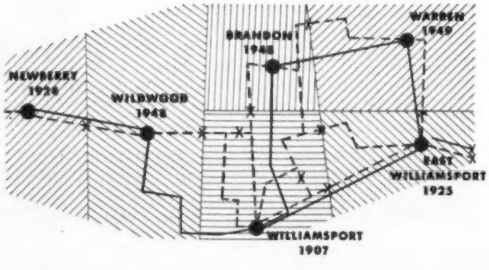
In 1907, Williamsport had a load of 400 kw, with only one substation required. By 1925, the load had increased to 5000 kw, resulting in additions of substations in both the eastern and western parts of the area.

LEGEND

——— 12-kv lines
– – – 4-kv lines
//////. Area of load responsibility
● Substation and year established
X Normal sectionalizing

Since 1925, the load has increased to 14,000 kw in 1951, and three more substations added. The lines feeding into Williamsport provide the reliability and capacity to expand the distribution system as the load grows.





Small power blocks ...long-range solution

Pennsylvania Power and Light Company can judge accurately the results of their system planning. Today this careful, long-range planning is reflected in their ability to supply more load . . . to grow easily and economically . . . to provide new high levels of service continuity. Small units of "load responsibility" are the cornerstone of this system, permitting them to take full advantage of modern *unitized* substations. The success of their long-range simplified system planning is measured by the practical yardstick of "economic workability".

ROSELAND

How they built their system . . . Definite "load responsibility" such as 1500-2000 kva for 4 kv, and 3000-10,000 kva for 12 kv, is assigned to each block. As the load grows, additional blocks of load responsibility are supplied from a carefully planned 66-kv subtransmission system, covering their 9500 square miles of area served. This simplified network, in conjunction with an overlying high-voltage transmission system, permits picking up blocks of load or introducing power supply where required, and enables Pennsylvania Power and Light Company to utilize the inherent flexibility and reliability of modern unitized substations.

Meeting the growth is the payoff . . . While easily and economically meeting load-growth problems like that at Williamsport, the Pennsylvania Power and Light Company have carried on a tremendous expansion program, adding capacity throughout the system. With changes in electrical demands, it won't be necessary to change their "plan" . . . they'll simply accelerate it or slow it down, as the situation requires. Because of the economy and effectiveness of such planning, this progressive utility has every reason to face new peak loads confidently . . . they're ready to grow and grow!

Westinghouse modern unitized equipment, when installed as an integral part of such a long-range plan, can contribute to the ease, dependability, and economy of your operation. A completely staffed System Planning Service is ready to assist you. Call your nearby Westinghouse Office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

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Speed Line Work!

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Proper Weight Distribution

Only a true 4x4 gives you up to 50% of the weight on the front wheels. This gives you the extra traction needed to speed utility line work.

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Utilizes full engine power through all transmission speeds. Exclusive safety lock prevents truck drive while boring.

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Keeps oil pump constantly submerged. An FWD exclusive that lets you bore holes, set poles on steepest grades.

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Doubles the number of transmission gear ratios. Provides low gear ratio for full power at extreme low speeds in tough, cross-country operations.

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DESIGNED WITH THE HELP OF VETERAN UTILITY MEN . . . FWD line construction and maintenance units handle your work . . . faster . . . safer . . . and at less cost. These mobilized tools get crews and equipment through to any location in spite of terrain or footing . . . speed work on the job . . . help maintain construction schedules or get service restored in a hurry. See your FWD dealer to get the facts on how FWDs can improve your service and earn more for each equipment dollar. The Four Wheel Drive Auto Co., Clintonville, Wisconsin. *Canadian factory*, Kitchener, Ontario.

Built by the makers of America's Foremost Heavy-Duty Trucks

Aid or Trade?
A CRISIS AHEAD

A crisis in the foreign trade relations of the United States is in the offing. It is a crisis caused by:

1. Efforts of producers in friendly nations to earn more dollars by increasing exports to the United States, and
2. Efforts of industries in the United States which would be hurt by competition from these imports to keep them out.

This crisis is a threat to the effectiveness of American leadership in the crucial effort to build the nations of the free world into a strong and unified group. It is the purpose of this editorial to advocate a constructive approach to the difficult situation that is developing.

Background of the Crisis

Most countries in the free world—with American aid—have managed to push their outputs well above prewar levels. As they have done so, they have been urged by our highest government officials to increase their exports to us. Sales in our market enable these countries to earn dollars which they use in turn to buy the products of America's farms and factories. Thus, as they become self-supporting, the need of American aid is reduced.

But as these efforts to export more to the United States have promised increasing success, competitive American producers have become increasingly alarmed about what that success might do to them. Consequently, they are seeking more protection—by appeals to the U. S. Tariff Commission to recommend higher import duties and by appeals to Congress for new laws to discourage imports.

Our Friends Protest

A year ago Congress answered one of these appeals by imposing a quota on imports of dairy products. Now, among many other legislative proposals being strenuously pressed is a move to extend the scope of "Buy American" legislation. A year ago the U. S. Tariff Commission had only four petitions for increased import duties on its docket. Since then fourteen more petitions have been filed and others are definitely on the way.

Faced by these mounting efforts to block the sale of their products in the American market, no less than eleven friendly nations, including Great Britain, France, Italy, Canada, the Netherlands, Switzerland and Denmark, have filed protests with our State Department. Through many of the protests runs one refrain. Although stated in diplomatic language, it might be correctly paraphrased to say: *"In*

sending us aid you have made it very clear that you want us to get on a self-supporting basis at the earliest possible moment. But, when we begin to make headway in that direction by trying to sell you more of the things we are equipped to produce, you start closing your market to us." The threat of European resentment against the United States being stirred up by this argument is obviously great.

At the same time there exist grounds for special resentment in the United States against certain prospective imports of European manufactured goods – those of machine tools, for example. In part these will be produced with machinery that has been sent to Europe as part of our economic aid program. With absolutely no diplomatic language involved, the argument, which will be extended much farther than the facts would justify, will run: "*We gave those people the equipment that they now use to cut our throats!*" This line of argument will find response among workers as well as employers in industries faced by more competition from imports. Labor, too, is keen for protection against more foreign competition.

Aid or Trade?

As between continuing direct economic aid to Europe or accepting the imports that would make those countries self-supporting, some would prefer to continue the aid program. They argue that the tax machinery of the federal government can spread the burden of aid broadly, while we have no comparable machinery that can cushion the shock to individual industries, firms and communities that may result from stepped-up imports of competitive products.

As we see it, this position is untenable. It would make rubbish of our Atlantic Charter promise ". . . to further the enjoyment by all States, great or small, victor or vanquished, of access, on equal terms, to the trade and to the raw materials of the world which are needed for their economic prosperity." It would be an admission that, for all our profession of faith in competition and our opposition to European cartels, we really don't believe in competition.

U. S. Self-Interest

The people of this country have invested billions of dollars and seven years of hard work in the attempt to put our allies on a self-supporting basis. If we keep their goods out by raising trade barriers, we are directly defeating our own purposes.

Also, in moving to protect some groups of American producers we should be hurting others. For many American producers the export market, which this year will take about $14 billion of civilian goods, spells the difference between operating at capacity and closing down 25% of their facilities. When we discourage imports we cut off dollar earnings by other nations which are spent here to keep some of our factories and farms going.

At the same time, it must be recognized that certain American industries and their capacity to maintain employment will be hurt by increased imports. Hence it becomes critically important for the United States to formulate a national program designed to help these industries and communities take up the shock.

There is no neat and simple prescription by which this can be done, but several possibilities have been suggested. One on which there is general agreement is that tariff reductions should be gradual. To cushion their impact, the government might well give preference on defense orders to industries and areas adversely affected by an increased volume of imports. Direct assistance to workers and companies in shifting to different lines of business may be worth consideration.

These are by no means all the possibilities. They may not even be the best. But they do serve to suggest the necessity for flexibility and imagination in dealing with the growing crisis in trade relations. *Our ingenuity in developing new ideas to meet this crisis may well be a decisive factor in our effort to weld the free nations into a strong and durable alliance.*

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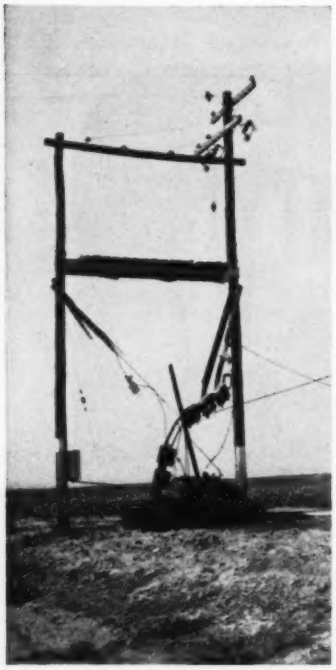
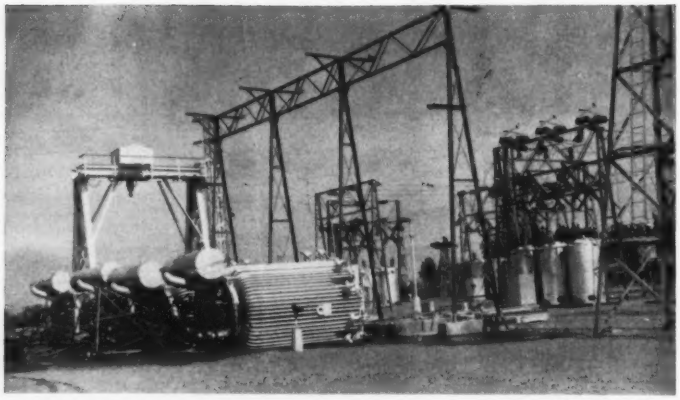
IN PG AND E'S SAN JOAQUIN POWER DIVISION



Taken by Pacific Gas and Electric Co. men in the Bakersfield area following the earthquake on July 21, these pictures show some of the damage caused by California's most severe quake since 1906. Electric service was restored within a few hours by all utilities in the quake area. Above: H structure showing all three 110-kva, 12,000/240/480-v transformers on the ground



These four transformers at Weedpatch substation were thrown off their foundation and toppled to their sides. The transformer buses were torn loose and completely destroyed

Leaning poles carry 70-kv and 12-kv lines four miles south of Weedpatch substation

Earthquake Rocks Utility Properties

Within minutes after the first shock of the earthquake that hit California July 21, utility crews were moved into trouble spots to inspect damage and restore service where interrupted.

Total damage to Southern California Edison Co. property was estimated at $100,000. Altogether 356 Edison circuits were interrupted when the quake hit at 4:53 a.m. By 11 a.m. service was restored to nearly all customers, with almost 90% of the circuits repaired. In addition to those in Tehachapi, center of the quake, circuits most affected were in Santa Barbara, Ventura and Oxnard.

Damage on the San Joaquin Power Division system of the Pacific Gas and Electric Co. was confined to the area around Bakersfield. Eleven power transformers in 60-kv substations toppled over either from creeping off foundations or from swaying. Service in such instances was restored in a matter of hours. Most serious damage was to agricultural pumping installation in the Wheeler Ridge area. In almost 100 cases transformer platforms for these 100- to 300-hp installations were shaken down leaving transformers dangling from distribution lines or dumping them to the ground.

Farmers in the Bakersfield area were worried over potential damage to wells. In many instances well casings are protruding one-half foot above ground, indicating ground settlement or possible lifting of the casing by the earth tremors.

Only damage to hydro facilities on the PG and E system was to the diversion works for the Borel plant on the Kern River where concrete was shattered. However, water continued to flow through the tunnel.

Los Angeles Department of Water & Power had 131 feeders out for an average of one to four minutes. Some lines were down but most rubbed against each other, shorted and were relayed. Four 34,000-v lines affecting 22 industrial stations were out briefly. Trouble dispatchers transmitted one message every 15 seconds over the radio communications system during 12½-hour emergency period.

WE Did SOMETHING ABOUT THE WEATHER!
Look for the light yellow coating — inside and out. Easy bending, non-flaking Triangle hot-dip galvanized conduit is also supplied with end-caps for protection of threads during shipping and handling.

-And Eliminated a Number of Headaches for You

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This special analysis coating is standard on *all* Triangle Conduit.

Obviously, Triangle conduit with this remarkable coating not only protects the conduit during shipping, storage and handling, but also makes the conduit *last longer* in service.

If rust or corrosion or any adverse condition is a problem for you, it will pay you to specify Triangle conduit. Ask your distributor!

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REPORT RECOMMENDS PLANT EXPANSION

Expansion of Puget Sound Power & Light's Baker River and White River plants to give additional capacity of 110,000 kw was recommended by Stone & Webster Engineering Corp. following a study of economic feasibility of such a project.

The report recommends installation of 55,000 kw of additional generating capacity at each plant. Estimated cost of the two installations is in the neighborhood of $18 million. The kilowatt-year cost is estimated at approximately $14.50, as compared with the $17.50 Bonneville rate.

In a statement following receipt of the report, President Frank McLaughlin of Puget Power said:

"With Baker River and White River, and all of its other major hydro plants, and around 50% of its distribution properties under condemnation, it is clear that Puget is not in a position to undertake the construction of this badly needed generating capacity." He continued, "Under present circumstances, the best available way to accomplish the installation of these new generating facilities is by means of an over-all acquisition of Puget's properties, as is proposed by the PUDs.

"It is inconceivable that a situation should be permitted to persist, especially at this time when the region is 'power hungry,' which denies the people in Puget's service area the industrial and other benefits which would obtain from the development of 110,000 kw of low-cost electric power right in their front yard."

● **General Electric** Co. submitted a low bid of $7,763,755 to the Corps of Engineers at Walla Walla, Wash., for installing four generators in McNary Dam power house. Contracts previously had been awarded for eight generators. All are rated at 73,684 kva each, will begin to go into operation June 1, 1956.

● **Stevens County PUD** of Colville, Wash., which recently acquired the $2 million Stevens County Electric Cooperative, has announced its intention of acquiring Washington Water Power Co. properties in the northern part of the county.

● **Bids** have been called by Lloyd Corp. Ltd. for construction of a $3.5 million office building at Portland to be leased by the Bonneville Power Administration. The structure will have 270,000 sq ft of floor space.

Easier to Maintain!

EVERY PART REMOVABLE FROM FRONT *in* NEW CLARK *type* "CY" AC STARTERS

Besides featuring an entirely new principle of arc interruption which substantially lengthens contact life, CLARK Type "CY" AC MOTOR STARTERS provide faster and easier inspection and maintenance by a new design which permits removal of every part from the *front*. No special tools are required.

Figure 1 shows the clean-cut open construction with easy access to wiring terminals and all components.

1. To inspect movable contacts, simply push down contact bars to depress springs "I".
2. To inspect stationary contacts, open snap-action cover clips "B" releasing lower arc shield "C" (Figure 2).
3. To replace movable contacts, loosen captive screws "D" and remove contact arm. Contacts are now quickly removed by twisting in either direction. (Figure 3).
4. With contact arm removed, stationary contacts can be replaced by dropping lower arc shield and turning contacts with wrench.
5. Magnet coil is easily changed by removing coil connections and loosening captive screws in coil clamps "G". Now remove armature "F" by pushing snap-in pin "E" in direction of knurled head. (Figure 4).
6. Stationary Magnet Frame "H" can now be removed by taking out four screws holding it to base plate.
7. To insert or replace an overload heater coil, remove one screw "J" and lift off cover plate.
8. An entire overload relay assembly can be removed by disconnecting wiring and taking out two screws holding it to the base plate.
9. Control circuit relay block can easily be removed from the front by taking out one screw, after moving contact arm has been removed as in Figure 3.
10. Entire control unit—on base plate—can be lifted from cabinet by loosening three screws "A".

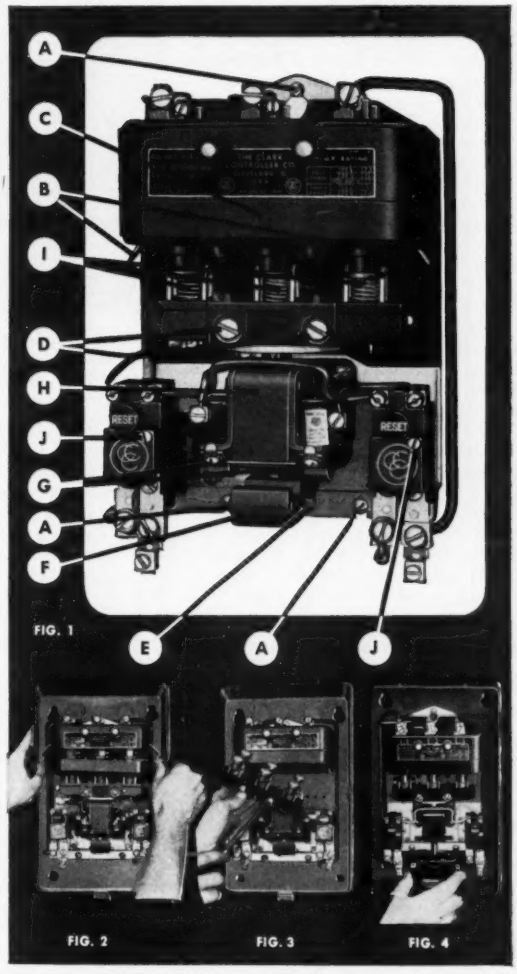

FIG. 1

FIG. 2 FIG. 3 FIG. 4

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COMPANIES TO AID FARM ELECTRIFICATION STUDY

A $7,800 fund to aid in research furthering use of electricity on farms has been given to Utah State Agricultural College at Logan by four power companies — Utah Power & Light, Southern Utah Power, Telluride Power and Uintah Power & Light.

Dr. Louis L. Madsen, president of the college, reported that studies will include refrigeration, crop harvesting and processing, drainage and sprinkler irrigation systems, farm shop equipment and domestic uses of electricity. A part of the grant will go toward demonstrating power uses to rural youth groups.

An advisory board known as the College-Industry Farm Electrification Committee has been set up to supervise the research program, with Prof. D. A. Broadbent, acting director of the Utah Agricultural Experiment Station, as committee chairman.

Power company members of the committee include: W. A. Huckins, manager, business development, Utah Power & Light; R. R. Thomas, vice-president, Southern Utah Power; Paul P. Ashworth, general manager, Telluride Power; Kenneth R. Aycock, manager, Uintah Power & Light; O. H. Ririe, Ogden division manager, Utah Power & Light; J. N. Stephens, business development manager at Preston for Utah Power & Light; O. M. Slack, American Fork division manager, Utah Power & Light.

Dr. Louis L. Madsen (right), president Utah State Agricultural College, accepts research check from R. R. Thomas, vice-president of Southern Utah Power. Standing are President H. R. Waldo of Telluride Power and President George M. Gadsby of UP&L

Government Will Help Restore Flooded Area

Faced with a court action seeking to prevent its impounding water behind Albeni Falls Dam on the Pend Oreille River near Sandpoint, Idaho, the Corps of Engineers has told the city that it will help restore sewage disposal and recreational facilities flooded by rising water.

The reservoir gates at the dam, still under construction, were closed June 11 to impound 1.4 million acre-ft of water that can be released this winter to increase production at downstream plants by an estimated 100,000 kw.

Sandpoint, in the center of a resort area, objects to flooding of a bathing beach and park. Furthermore, flooding of the city's sewage disposal plant would be injurious to the health of the inhabitants, the city contends.

Engineers explained that the water behind the dam went up faster than they had expected and that they weren't completely ready. Col. Emerson Itschner, North Pacific division engineer, said that the engineers previously had rejected plans for a sewage treatment plant because they believed that the government could not legally share the cost. That was because the city did not then own the land on which the plant was located. Now that the city holds title to the property, the government can help, he said.

● **British Columbia** provincial authorities have agreed to accept $255,508 for all damages from flooding of areas across the international boundry line by Seattle City Light's Ross Dam on the Skagit River. E. R. Hoffman, City Light superintendent, has asked for an emergency appropriation of $285,000 from City Light funds to close the deal and pay certain additional expenses connected with it. The dam creates a reservoir that eventually will extend almost eight miles across Canadian territory, covering several ranches and other property.

● **Arizona citizens** invested some $950,000 to buy 75,000 shares of common stock during the recent offering of 400,000 shares by Arizona Public Service Co. President Henry B. Sargent told a board of directors meeting recently that final tabulations showed it was one of the largest investments made in a single company at one time by the state's residents.

Contract Awarded for California's Nimbus Dam

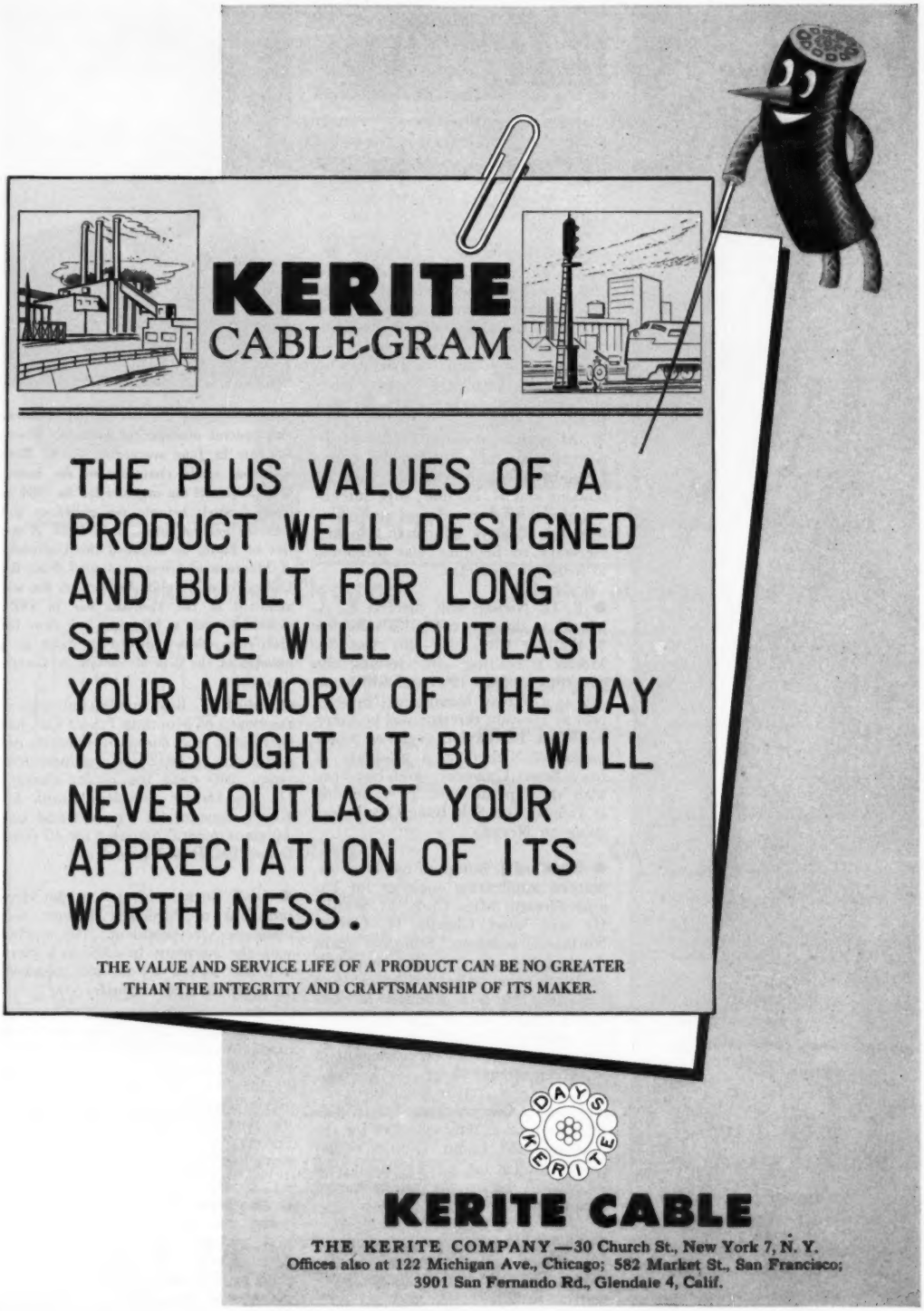
The United States Bureau of Reclamation announces the Winston Brothers Co. and the Al Johnson Construction Co. of Monrovia, Calif., have been awarded a contract for construction of the Nimbus Dam and power plant on the American River 15 miles east of Sacramento, Calif. The firms' bid of $6,027,353 was the lowest of nine submitted.

Nimbus Dam will serve as an afterbay for regulation of water released from Folsom Dam, being constructed by the Corps of Engineers seven miles upstream. Nimbus power plant will have 13,500 kw generating capacity.

Work on the project is scheduled to begin by the end of July and be completed within 860 calendar days.

● **Hawaiian Electric** Co. has filed for its first rate increase in 30 years—a 12% boost to meet extra costs of operation and clear the way for a $23 million expansion program. It estimates the change will add $1.5 million a year to its gross revenues. The request now is before the Hawaii Public Utilities Commission.

● **Mountain States Power** Co. has asked FPC for authority to sell at competitive bidding 200,000 shares of $7.25 par value common stock.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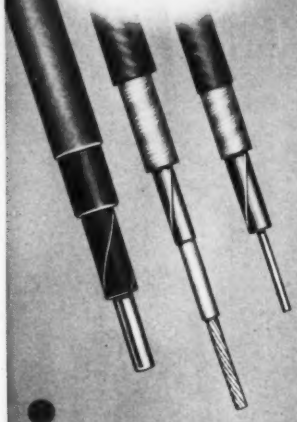

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NEWS ABOUT PEOPLE

● Southern Colorado Power Co. has announced several personnel changes since retirement of **W. J. Benning,** vice-president and treasurer, and **M. G. Lord,** vice-president in charge of operations. **R. M. Miller** is now secretary-treasurer. **W. C. Porter Jr.,** Lord's assistant, has been made general operating superintendent. **George W. Devine,** formerly master mechanic, is superintendent of mechanical maintenance. Porter's former position was split into two new jobs, with **E. R. Webber** as superintendent of production and **Howard Reader** as chief design engineer. **Fred W. Morgan** succeeded Webber as superintendent of the Pueblo plant; **Leonard Meek** is assistant superintendent and **H. L. Sims,** superintendent of electric construction and maintenance. **Gladys Hartman,** former secretary to Benning, was promoted to assistant secretary.

● **E. G. Nielsen** will succeed **E. A. Moritz** as director of USBR's Region 3, Boulder City, Nev., on Aug. 31. Moritz is retiring after serving the government since 1905 and will be on call as a bureau consultant. Nielsen's post as assistant director will be taken by **Wade H. Taylor,** regional power manager. Nielsen is a graduate of Iowa State University and has been with the bureau since 1934, serving at Denver and Salt Lake City before going to Nevada.

● **Bradford J. Stimpson** has been appointed application engineer for Pacific Electric Mfg. Corp. at Seattle. He will assist **Charles H. Cutter,** Northwest manager. Stimpson spent the last five years in the company's circuit breaker sales division at San Francisco. He is a graduate in electrical engineering of the University of California and before joining Pacific Electric was a first lieutenant in the Army Signal Corps.

● **Roy D. Cameron** has been made sales promotion representative for the Westinghouse Lamp Division's Pacific Coast district. Cameron had been a central California salesman for Minnesota Mining & Mfg. Co.

● **C. W. Hunter** is now sales and application engineering manager for Lenkurt Electric Co. of Canada, Vancouver, B. C.

John E. Corette Jr. was elected president and general manager of Montana Power Co. late in June succeeding F. W. Bird, who was made chairman of the board. Corette joined the organization in 1934 as legal counsel; became vice-president and assistant general manager in 1944. A native of Butte, he attended the University of Montana and was graduated from the University of Virginia law school. He was admitted to the Montana bar in 1929, practiced with a Missoula law firm for four years, then returned to Butte as a member of the firm of Corette & Corette

● **Frank W. Bird,** made chairman of the board of Montana Power Co., has been with that company since its organization in 1912 and was president from 1940 until the recent change. He was former President Frank M. Kerr's assistant for 25 years and was assistant general manager for 10 years before he became president.

● **C. J. Burns,** assistant to the vice-president of Montana Power, was made a vice-president. He started with the company in 1920 as a clerk and has served as division manager at Bozeman and at Butte.

● **Donald J. Sterling,** for 34 years managing editor of the Oregon Journal, Portland, has joined the staff of Pacific Power & Light Co. as public affairs consultant. An ex-president of the American Society of Newspaper Editors, he retired from newspaper work last March.

● **Anaconda Wire & Cable Co.** has transferred **A. W. Tracy** from Denver to Los Angeles as district manager. **K. G. Eaton,** formerly district engineer at Denver, succeeds Tracy as manager of that office.

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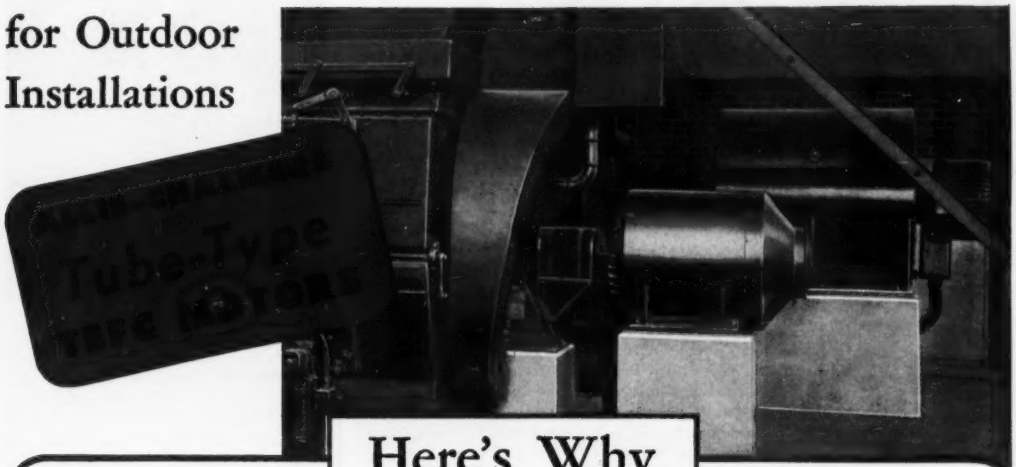
for Outdoor Installations



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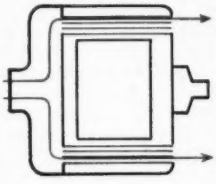
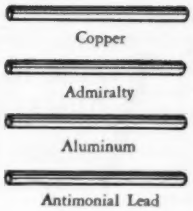


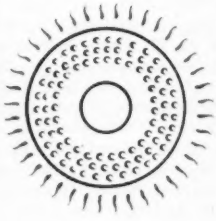
Air-to-air heat exchanger has straight, smooth tubes with no pockets in which dirt or moisture can collect. Velocity of cooling air through the tubes keeps surfaces swept clean. If sticky dirt should pile up, the tubes can be cleaned in a few seconds with a long handled brush.

Choice of Tube Materials



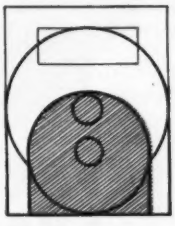
Allis-Chalmers tube-type motors can be built for service in corrosive atmospheres and for outdoor operation in almost any climate. Tubes may be made of a variety of materials, depending on service conditions.

Uniform Cooling



Tubes for carrying cooling air are distributed uniformly around the perimeter of the stator and along its full length. Result: heat travels over a short path and the interior is uniformly cooled.

Compact



Allis-Chalmers tube-type motors are little or no larger than open motors of the same rating. Tube-type design exposes large surface area to cooling air in minimum space.

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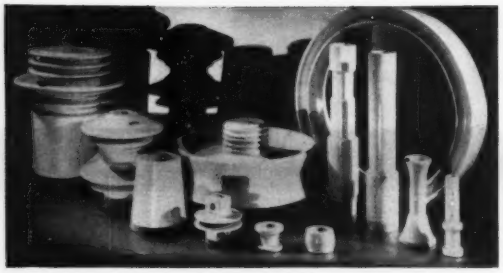

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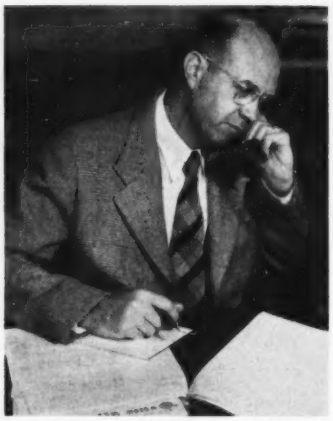


Cockfield

● **Robert H. Cockfield** has been appointed business agent, the head commercial post, by the commissioners of the Los Angeles Department of Water & Power. He was selected from a field of some dozen or more who took the examination for the position upon the retirement of **Charles C. Snyder,** June 1. Cockfield has been manager of residential sales since 1941. A graduate in electrical engineering from University of Southern California in 1923, he began as station operator for Southern California Edison Co. He began with the department's business agent's division in 1925 as office power salesman. He helped establish the EMEA of Southern California through the former Electrical Development League and helped in the re-establishment of the Electrical League of Los Angeles, acting as its first president.

● **C. A. Patton** has been appointed to succeed **O. G. Steele** as manager of the California Oregon Power Co.'s Yreka and Dunsmuir, Calif., divisions with headquarters in Yreka. Steele's retirement became effective June 30. He was with the power company for 49 years. Patton has been with the Copco's North Umpqua River division for the last five years. He formerly was an engineer with the Missouri highway department.

● **Larry Bloom,** who has been associated with electrical distributors such as California Wholesale Electric Co. and others in southern California for a number of years, has joined the editorial staff of Biddle Trade Bureau in Los Angeles, publishers of electrical wholesale and contracting pricing services and catalogs.

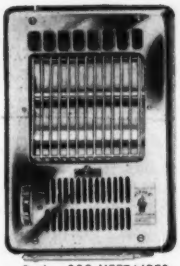
Deaths

● **Edwin M. Cutting,** for many years prominent in the electrical industry in northern California and known affectionately as "Uncle Ed," died at his home in Marysville, Calif., July 2 at the age of 82. He was a native of Niles, Calif., and started his career in the Southern Pacific signal department at Oakland, later was engineer of train lighting for the entire system. From 1913 to 1920 he was Western manager for the Edison storage battery interests and in 1920 went to Orange, N. J., with the Thomas A. Edison organization. From 1923 until his retirement in 1940 he was with Pacific Gas and Electric Co. in Marysville. He served a term as president of the San Francisco Electrical Development League, now the Electric Club.

● **Louis Anton Buese,** 65, senior vice-president and executive engineer of Hawaiian Electric Co., died July 10 in Honolulu after a 10-day illness. A native of Republic, Mich., he attended the University of Michigan and, before going to Hawaii in 1937, was a design engineer for Los Angeles Gas & Electric Co. and the Bureau of Power and Light in Los Angeles. Mr. Buese had held the posts of vice-president and executive engineer since November 1945, when he also was made a director of the company. He was in charge of engineering, construction, operations and maintenance.

● **Harry C. Lynde,** a pioneer with 35 years in the lighting profession, died in Seattle last month. He was in the school of architecture at Washington State College until 1917, worked for several lighting fixture companies in Spokane and Seattle, in 1922 formed the Bailey-Lynde Co. to manufacture lighting equipment, later consolidated with Cascade Fixture Co. In 1939 he formed the Harry C. Lynde Co. and was its president. This has been operated by Irene McGowan since 1942, when Mr. Lynde affiliated with Beverly A. Travis & Associates, consulting electrical engineers.

● **James Titus Barrett,** 63, partner in Kaemper & Barrett Co., San Francisco radio and appliance distributor, died suddenly at his San Carlos home July 23. He had worked with the firm since its organization in 1930 and previously had served as radio sales manager for Listenwalter & Gough.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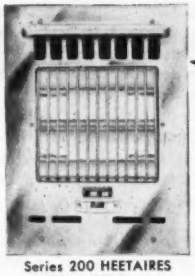
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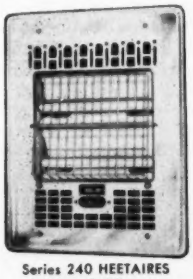
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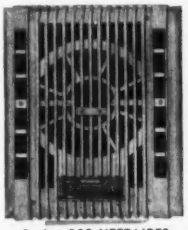
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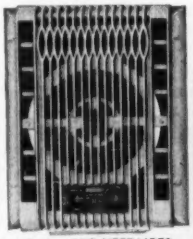
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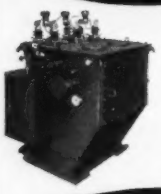

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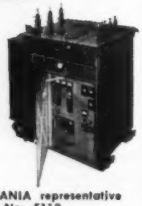

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P. O. BOX 51, ROCHESTER 1, N. Y.

NOTES ON THE TRADE

● **L. E. McGuire** has been appointed Pacific Northwest district manager for Copperweld Steel Co.'s wire and cable division, with headquarters in the Vance Bldg., Seattle 1, Wash. According to **Paul Van Wagner,** vice-president in charge of sales, a Northwest office was opened to give better service in that area. **Harry J. Billica,** who formerly handled the entire Pacific Coast territory for Copperweld, will continue as San Francisco district manager, in charge of sales in California, Nevada and Arizona. McGuire will handle sales in Washington, Oregon, Idaho, Utah and western Montana.

● **General Electric Supply Corp.** is no more as a corporate name. Effective July 1 that part of General Electric Supply Corp. that had to do with appliance distribution business became General Electric Distributing Corp. and the wiring supply business previously conducted will be carried under the name of General Electric Supply Co., a division of General Electric Distributing Corp. No change in addresses or personnel is announced with this change in corporate setup.

● **A major expansion** of its Watson, Calif., plant for the production of industrial insulations has been announced by Johns-Manville Corp. According to **A. R. Fisher,** president, the new facilities will provide an additional 80 to 100 jobs. The plant now employs about 500. The building, which will have about 100,000 sq ft of floor space, will be completed in the fall of 1953. Other Johns-Manville West Coast plants are at Los Angeles, Lompoc, Redwood City and Pittsburg, Calif.

● **I-T-E Circuit Breaker** Co. has established a southern California district office with headquarters at 722 E. Washington Blvd., Los Angeles. **W. R. L'Hommedieu,** who has been the company's representative in the area, is now district manager. He will be assisted by **Edmond Lanski,** field application engineer. Sales and engineering service are offered on electrical switchgear, circuit breakers, bus structures, unit substations and other I-T-E products.

McGuire

● **C. T. Bakeman & Associates** call attention to an error in our Directory listing of some of the lines represented by them. Bakeman recently moved to 445 Bryant St. from 752 Natoma, San Francisco, carried in a previous report. Lines handled are F. W. Wakefield Brass Co., the Wakefield Ceiling, Silvray Lighting Inc., Vision Aids Inc., Skylite Inc., Gotham Lighting Inc., Wheeler Reflector Inc., and the Kirlin Co.

● **Frigidaire** has announced changes in its Oakland, Calif., branch organization. **H. J. Miller** has been promoted to the headquarters organization at Dayton, Ohio, as assistant manager, appliance sales department. **W. H. Baldwin** will succeed him as branch manager at Oakland. **W. F. Cronin** has been promoted from metropolitan appliance sales manager to appliance sales manager to replace Baldwin.

● **Corwin** Co., 1147 S. Hope St., Los Angeles, will distribute Hamilton Beach small appliances, including the mixer, hair dryer and vacuum cleaners.

CORROSION ENGINEERS

Leading engineering and construction firm offers staff positions to corrosion engineers with minimum of three or four years experience in corrosion investigations and design of cathodic protection on pipe lines and lead cables in country and city networks. Must be graduate electrical engineer (or equivalent). Work involves extensive travel, with headquarters in New York City. Salary commensurate with experience and ability. Good opportunity for advancement. Box 267, Electrical West, 68 Post St., San Francisco 4, Calif.

SPANG CENTRAL CONDUIT

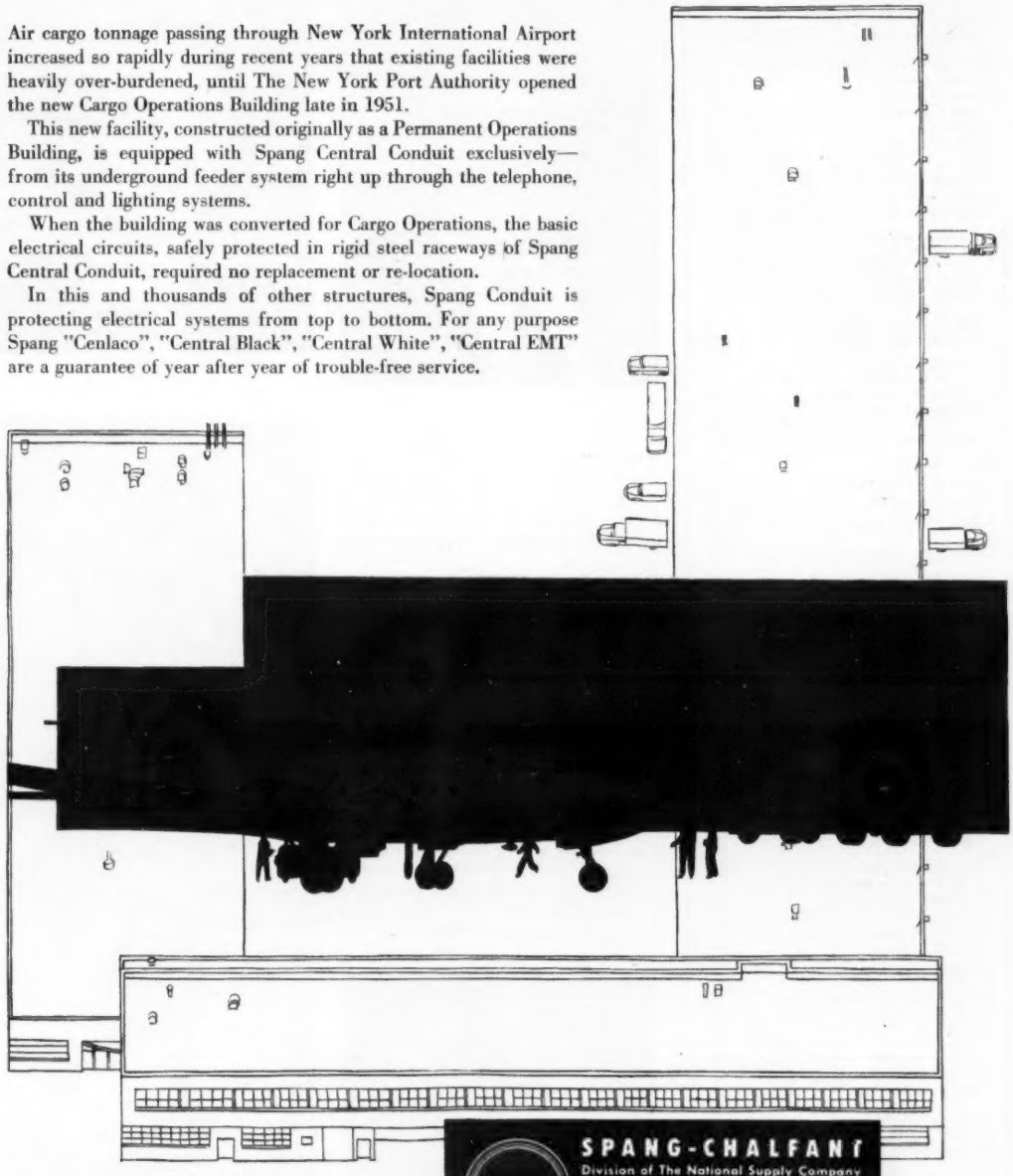
serves IDLEWILD'S newly completed air freight terminal

Air cargo tonnage passing through New York International Airport increased so rapidly during recent years that existing facilities were heavily over-burdened, until The New York Port Authority opened the new Cargo Operations Building late in 1951.

This new facility, constructed originally as a Permanent Operations Building, is equipped with Spang Central Conduit exclusively—from its underground feeder system right up through the telephone, control and lighting systems.

When the building was converted for Cargo Operations, the basic electrical circuits, safely protected in rigid steel raceways of Spang Central Conduit, required no replacement or re-location.

In this and thousands of other structures, Spang Conduit is protecting electrical systems from top to bottom. For any purpose Spang "Cenlaco", "Central Black", "Central White", "Central EMT" are a guarantee of year after year of trouble-free service.



Owner: The Port of New York Authority.
Architects: Lorimer and Rose, New York.
General Contractor: Corbetta Construction Co., New York.
Electrical Contractor: Johnson Electrical Corporation, New York.

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
GRANT BUILDING, PITTSBURGH 30, PA.
District Offices and Sales Representatives in Principal Cities

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PROFILES

Dierdorff

John Dierdorff, vice-president of Pacific Power & Light Co., was elected president of the Northwest Electric Light & Power Assn., succeeding A. S. Cummins, president of the California Oregon Power Co.

Johnson

Nancy Ellen Johnson has been named the Pacific Coast regional director of home economics for Westinghouse, to replace Lois Ferris, who resigned to be married. She comes from Mansfield, Ohio, where she was district home economics director

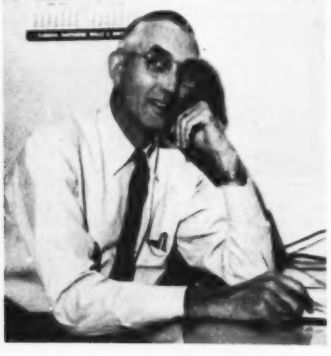
Ross Paine

Bill Ross, 40 years with G-E Lamp Div., receives a token from Rees Paine, manager Oakland Lamp Works, with congratulations

Dale Markham, Colorado Springs inspector, again is chairman of the Rocky Mountain Chapter of the electrical inspectors

Jack Rohring, So. Calif. Edison, turned over the gavel of president of So. Calif. EMEA to George Larsen, Larsen-Hogue Elec. Co.

Rohring Larsen

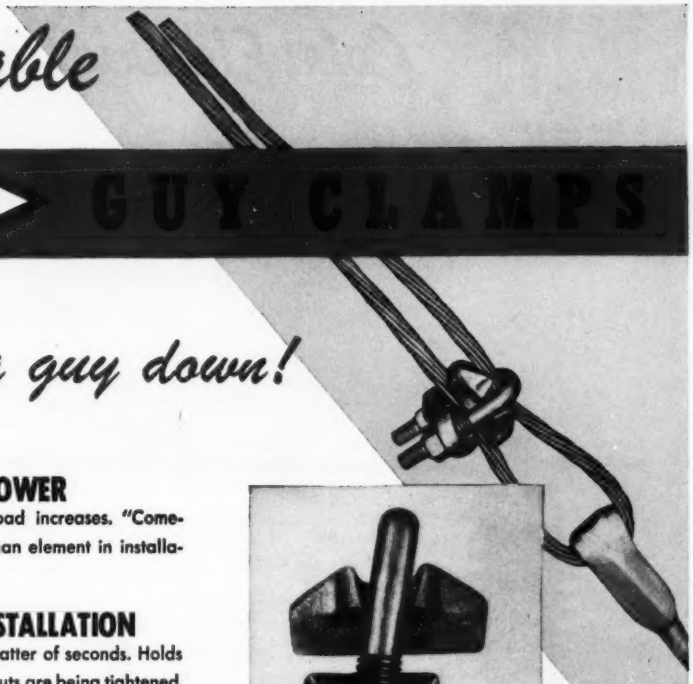


Markham

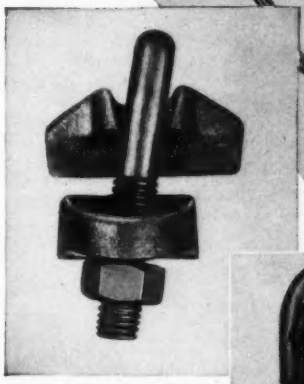
Dependable

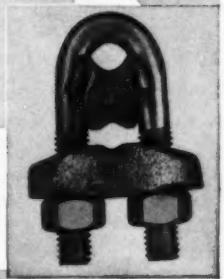
MIF GUY CLAMPS

Never let a guy down!



- **GREATER HOLDING POWER**
  Clamping force increases as load increases. "Come-along" type grip minimizes human element in installation.
- **GREATER EASE OF INSTALLATION**
  Can be placed on strand in a matter of seconds. Holds strand in proper position while nuts are being tightened.
- **GREATER FLEXIBILITY**
  Each size accommodates a wide range of strand diameters. Substantial savings in handling and inventory.
- **GREATER ECONOMY**
  Low weight and cost per unit of holding power.





PAX67 Clamp rated 12,500 lbs. Note relative position of parts during tilting. Separating Block and Clamping Plate remain parallel at all times.

MIF UNIVERSAL CLAMPS

PAX64C accommodates 3/16"-3/8" dia. strands.

This series of clamps offers same unusual performance characteristics with added advantage of equal clamping surfaces on both wires. Particularly recommended on conductors or for general use where system standardization is desired.

SPECIFICATIONS

Cat. No.	# Rating lbs.	Strand Dia. Range	Wgt. Per C Pcs.
PAX64	7,500	3/16"-3/8"	55 lbs.
*PAX67	12,500	1/4"-1/2"	122 lbs.
*PAX64C	7,500	3/16"-3/8"	67 lbs.
PAX67C	12,500	3/8"-1/2"	142 lbs.

* Illustrated.
#PAX64 & PAX64C Based on tests with nuts tightened to 45 ft./lbs.
PAX67 & PAX67C Based on tests with nuts tightened to 85 ft./lbs.

MALLEABLE IRON FITTINGS CO.

Pole Hardware Division Branford, Connecticut

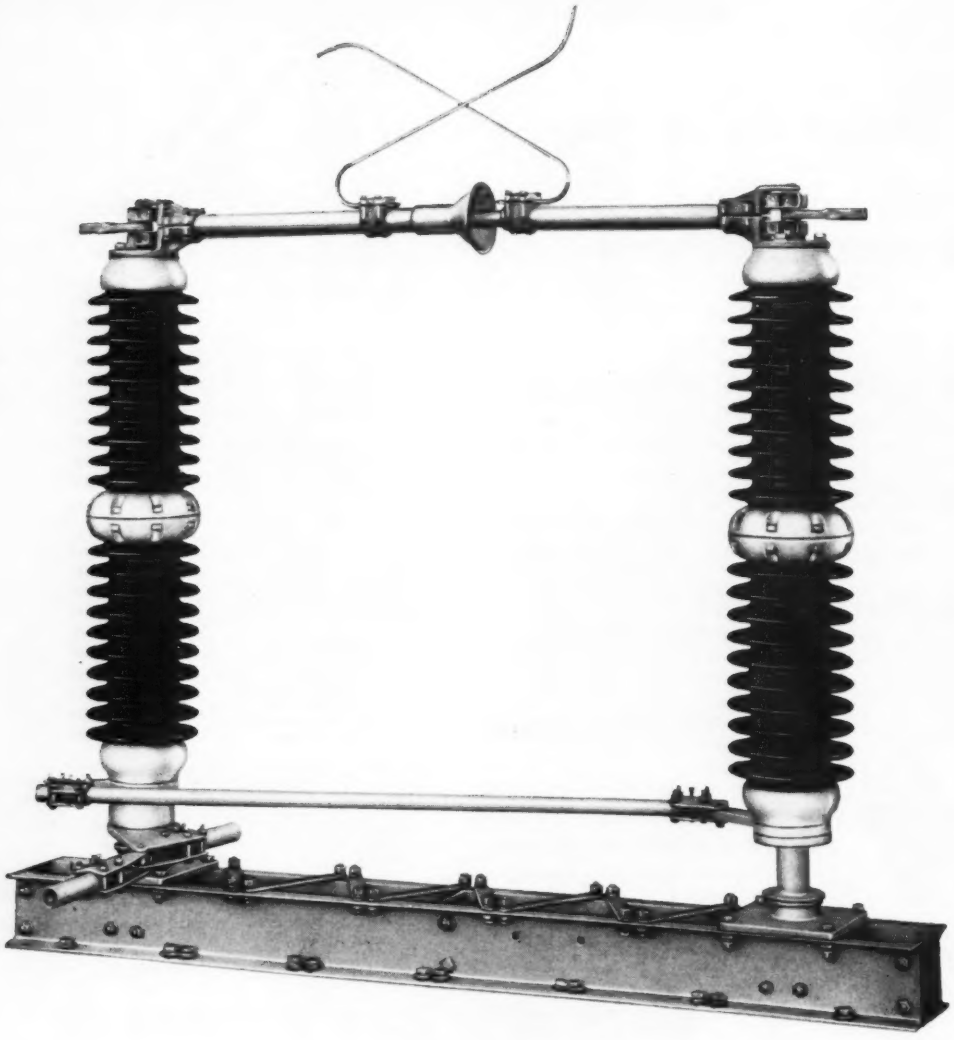
N. Y. Office: 30 Church St.
Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

MIF

WESTERN REPRESENTATIVES
WM. J. COTTRELL CO., 11341 S. W. Pacific Hwy., Portland 19, Oregon
INDUSTRIAL ENGR. & EQUIP. CORP., 720 Subway Terminal Bldg., Indianapolis 4, Ind.
WALTHAM, DeWITT & KRUSI, 630 Monadnock Bldg., San Francisco 5, Cal.

Cole Electric Co.

8439 Steller Drive TExas 0-4701 Culver City, Calif.

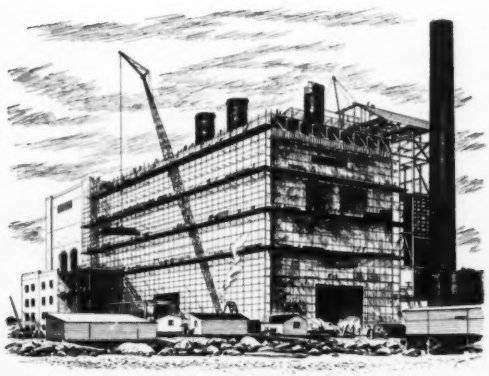


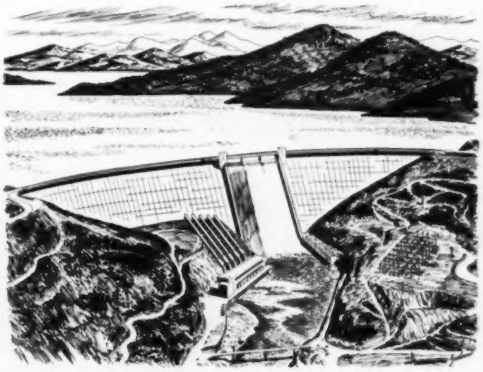
AIR BREAK DISCONNECTING SWITCH
115,000 Volts—600 Amperes—Type PU
Horizontal Mounting—Three Pole—Center Side Break—Group Operated
SILVER TO SILVER CONTACTS
One Pole Shown
See Bulletin 40A

The Charles A. Coffin Medal is awarded annually by the Edison Electric Institute, an industry-wide organization, to that utility having the outstanding record of accomplishments and public service. The Coffin Award, most highly regarded of electric industry marks of distinction, was established 30 years ago.

P. G. and E. wins electric industry's highest honor

for major achievements during 1951





A half million dollars every working day was spent by P. G. and E. during 1951 building new plants and new facilities to serve one of the fastest growing areas in the nation. Last year's construction was part of the Company's billion dollar building program which has already doubled the supply of power and gas available to customers in its area since V-J Day. Thrifty citizens—not the government—financed this largest construction program in utility history.

Cooperating with the Government, P. G. and E. has signed two long term agreements with the Bureau of Reclamation. These provide for the sale and interchange of power, and for use of P. G. and E. facilities in marketing Central Valley Project power. P. G. and E. has paid $44 million for CVP power to date and will continue to provide the principal source of revenue for the whole Project. At the same time P. G. and E. continues to be California's largest property taxpayer.

The citation said, in part: "For its courageous undertaking and its able execution of a huge expansion program, for its cooperative and far-seeing acts which brought to all the people of the area and to the taxpayers of the nation the greatest economic advantage in putting to use the electricity generated as a by-product of a major irrigation and flood control project, and for the inestimable value which these great achievements have had in the preservation of the American system of free enterprise and in furthering the progress of the electric industry, the Pacific Gas and Electric Company is hereby declared the winner of the Charles A. Coffin Award for 1951."

Pacific Gas and Electric Company . . . serving you better every year

23X-W-752

ONE OF A SERIES OF ADS TELLING HOW YOU CAN MAKE YOUR P.C.E.A. MEMBERSHIP PAY DIVIDENDS

All the Comforts of OHM!

Don't laugh! There actually is such a structure — up in Montana! It has a 1,000-w yard light, 200-w reading light, 1,500-w fan-type heater, 50-w germicidal lamp, 50-w radio, two 250-w infra-red lamps, 100-w exhaust fan and other accessories—a total load of 3.5 kw!

This extreme example of rural electrification recently came to the attention of P.C.E.A.'s Agricultural Load Building Committee, which normally gathers and disseminates information of a more practical nature on any new farm applications of electricity.

The Agricultural Load Building Committee is only one of the 30 P.C.E.A. committees that are actively engaged in helping our industry grow in size and scope of service. Their accomplishments over a 35 year period have played a large part in making this the most highly electrified region in the United States.

But their job is far from finished. There is always room for improvement in an industry as dynamic as ours. You can help, and you will benefit, by taking part in one of P.C.E.A.'s many activities.

This FREE booklet tells what P.C.E.A. already has done and suggests ways for you to take part in its big program. Send for it TODAY!

PACIFIC COAST ELECTRICAL ASSOCIATION

601 WEST FIFTH STREET, LOS ANGELES 17 — 447 SUTTER STREET, SAN FRANCISCO 8